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VOLUME II:
FINAL PROGRAM ENVIRONMENTAL IMPACT REPORT, AS REVISED

Integrated Pest Management Program

State Clearinghouse No. 2019100325

PREPARED FOR:

Santa Clara Valley Open Space Authority
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Final Program Environmental Impact Report for the Integrated Pest Management Program

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LIST OF ABBREVIATIONS

AB 52	Assembly Bill 52
ATV	all-terrain vehicle
Authority	Santa Clara Valley Open Space Authority
BAAQMD	Bay Area Air Quality Management District
BCA	biological control agent
BMP	best management practices
Board	Board of Forestry and Fire Protection
CAL FIRE	California Department of Forestry and Fire Protection
Cal/OSHA	California Occupational Safety and Health Administration
CalEPA	California EPA
Caltrans	California Department of Transportation
CCR	California Code of Regulations
CDFA	California Department of Food and Agriculture
CDFW	California Department of Fish and Wildlife
CEQA	California Environmental Quality Act
CESA	California Endangered Species Act
CFR	Code of Federal Regulations
CNDDB	California Natural Diversity Database
CRLF	California-red legged frog
CUPA	Certified Unified Program Agencies
CWA	Clean Water Act
dbh	diameter at breast height
DE	diatomaceous earth
District	Midpeninsula Regional Open Space District
DPR	California Department of Pesticide Regulation
DPS	Distinct Population Segment
DTSC	California Department of Toxic Substances Control
EIR	environmental impact report
EPA	U.S. Environmental Protection Agency
EPCRA	Emergency Planning and Community Right-to-Know Act
EPM	environmental protection measure
ESA	federal Endangered Species Act

FCG	California Fish and Game Code
FHSZ	fire hazard severity zones
FIFRA	Federal Insecticide, Fungicide, and Rodenticides Act
FRA	Federal Responsibility Areas
GAMA	Groundwater Ambient Monitoring and Assessment
GHG	greenhouse gas
GIS	geographic information system
HAZWOPER	Hazardous Waste Operations and Emergency Response
HMSO	Hazardous Materials Storage Ordinance
HWCA	Hazardous Waste Control Act
IGR	insect growth regulator
IPM Program	Integrated Pest Management Program
IPM	Integrated Pest Management
LRA	Local Responsibility Area
LUST	leaking underground storage tank
MBTA	Migratory Bird Treaty Act
MCL	maximum contaminant levels
MLD	most likely descendant
MMRP	mitigation monitoring and reporting program
NAHC	Native American Heritage Commission
NDMA	nitrosodimentylamine
NHPA	National Historic Preservation Act
NMFS	National Oceanic and Atmospheric Administration, National Marine Fisheries Service
NOP	Notice of Preparation
NPDES	National Pollutant Discharge Elimination System
NPPA	Native Plant Protection Act
NRHP	National Register of Historic Places
NWIC	Northwest Information Center
OEHHA	Office of Environmental Health Hazard Assessment
OSHA	Occupational Safety and Health Administration

PCA	Pest Control Advisor
PCE	primary constituent element
PEIR	Program Environmental Impact Report
PPE	Personal Protective Equipment
PPM	part per million
PRC	Public Resource Code
RCRA	Resource Conservation and Recovery Act
ROW	rights-of-way
RUP	restricted use pesticide"
RWQCB	regional water quality control boards
SB 18	Senate Bill
SCCFD	Santa Clara County Fire Department
SCCFSC	Santa Clara County Fire Safe Council
SCVWD	Santa Clara Valley Water District
Secretary's Standards	*Secretary of the Interior's Standards for the Treatment of Historic Properties*
SFBAAB	San Francisco Bay Area Air Basin
SLF	Sacred Lands File
SR	State Route
SRA	State Responsibility Area
SWRCB	State Water Resources Control Board
TMDL	total maximum daily load
USACE	U.S. Army Corps of Engineers
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
UST	Underground Storage Tank
VMT	vehicle miles traveled
VOC	volatile organic compounds
WDR	waste discharge requirements
WPS	Worker Protection Standard
WUI	wildland-urban interface

EXECUTIVE SUMMARY

ES.1 INTRODUCTION

This document is the ~~Draft~~ Program Environmental Impact Report (PEIR) for the Santa Clara Valley Open Space Authority's (Authority) proposed Integrated Pest Management (IPM) Program.

This summary is provided in accordance with California Environmental Quality Act Guidelines (State CEQA Guidelines) Section 15123. As stated in Section 15123(a), "an EIR [environmental impact report] shall contain a brief summary of the proposed action and its consequences. The language of the summary should be as clear and simple as reasonably practical." As required by the State CEQA Guidelines, this chapter includes (1) a brief summary of the IPM Program, (2) each significant effect and proposed mitigation measures (Table ES-1), (3) a discussion of the areas of controversy and issues to be resolved that are known to the Authority associated with the IPM Program, and (4) identification of the alternatives evaluated and the environmentally superior alternative. Section 15126 of the State CEQA Guidelines also requires discussion of significant irreversible environmental changes and growth-inducing impacts of a proposed project; these topics are also discussed in this summary.

ES.2 SUMMARY OF THE IPM PROGRAM

The Authority is the Lead Agency for the IPM Program PEIR. The Authority proposes to implement an IPM Program to comprehensively direct pest management on 14 of the Authority's open space preserves (IPM Program Area) within Santa Clara County (refer to Figure 2-1) The IPM Program is intended to describe comprehensive guidelines and procedures for the careful management of pests throughout the IPM Program Area while protecting natural resources and public health.

Currently, the Authority implements manual, mechanical, and chemical treatments for vegetation and animal pest management near roads and trails, recreational facilities, structures, and sensitive habitats. The IPM Program would expand upon the types, frequency, and geographic extent of existing IPM activities conducted by the Authority. Under the IPM Program, the Authority would increase the number of manual, mechanical, and chemical treatment projects occurring simultaneously. Specific treatment activities that would occur under the IPM Program include:

- Manual Treatments: prevention, sanitation, pulling, digging, hoeing, physical barriers/exclusion, covering/tarping, crop rotation, soil sterilization, mulching, weedmats, release of biocontrol insects, trapping, gigging, shooting, and electrical currents.
- Mechanical Treatments: the use of motorized equipment for activities including mowing/cutting, cultivation, discing, girdling/frilling/drilling, and green flaming.
- Chemical Treatments: use of pesticides, including herbicides, insecticides, one rodenticide, and one fumigant. Herbicides would be applied through cut-stump, spray (by hand or via a boom on an all-terrain vehicle [ATV]), and wick application methods. Insecticide baits would be used in structures and buildings in tamper-proof bait stations and sprays would be used as a last resort and target specific individuals or populations (e.g., problem wasp nests). Rodenticides are not currently used by the Authority and would be used as a last resort to control pest infestations that create threats to human health or safety after other non-chemical treatment options are exhausted. Tenting and fumigation would be used as a last resort to treat termite infestations within affected buildings and structures. The entire fumigation process, including the handling of the fumigant, would be implemented by a certified applicator.

A detailed description of the IPM treatment types covered under the IPM Program and typical conditions (i.e., management category) in which they would be used are provided in Chapter 2, "Program Description."

ES.2.1 IPM Program Objectives

The overall goal of the IPM Program is to effectively manage pests in the Authority's open space preserves and facilities, while protecting human health and environmental quality. Specific objectives of the proposed IPM Program include the following:

- develop and implement site-specific pest management strategies that are effective in controlling targeted pests while avoiding damage to natural resources, promoting visitor safety and enjoyment, and protecting human health;
- keep the interested public informed about treatment strategies, upcoming projects, and environmental and public health protection measures;
- inhibit the establishment of new invasive species on Authority preserves, such as new invasive plants in natural areas, rangelands, and agricultural properties;
- maintain an inventory of invasive species infestations, monitor treatment effectiveness, and incorporate relevant monitoring results into future treatment applications;
- implement an adaptive management framework to promote the long-term effectiveness of pest management activities; and
- develop and implement an IPM Manual to standardize pest management and IPM procedures.

To achieve these objectives, the Authority has prepared an IPM Program Guidance Manual (Appendix B) to facilitate the design and implementation of pest management strategies that are effective in controlling target pests, cost-effective, safe for human health, and protective of natural resources, including native species, special-status species, and water quality. The main components of the IPM Program are identifying the target species and understanding their life cycle, assessing distribution and abundance of pests, setting thresholds for targeted control, assessing site conditions to identify appropriate treatments, using the most benign suite of control methods to target the most vulnerable stage in a pest's life cycle, and preventing pest problems through early detection and rapid response programs.

ES.3 SUMMARY OF ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

Pursuant to State CEQA Guidelines Section 15382, a significant effect on the environment is defined as "a substantial, or potentially substantial, adverse change in any of the physical conditions within the area affected by the project, including land, air, water, minerals, flora, fauna, ambient noise, and objects of historic or aesthetic significance." Chapter 3 of this ~~Draft~~ PEIR describes in detail the significant environmental impacts that would result from implementation of the proposed IPM Program and Chapter 4 provides a detailed discussion of potential cumulative impacts. Table ES-1, presented at the end of this chapter, provides a summary of the environmental impacts discussed throughout Chapter 3 of this PEIR. Table ES-1 provides the level of significance of the impact before mitigation, proposed mitigation measures to reduce the impact, and the level of significance of the impact after implementation of the mitigation measures.

ES.3.1 Significant-and-Unavoidable Impacts

Detailed mitigation measures to be implemented by the Authority are identified in Chapter 3 of this ~~Draft~~ PEIR, which are intended to mitigate the IPM Program's significant and potentially significant effects to the extent feasible. These mitigation measures are summarized in Table ES-1. After implementation of the proposed mitigation measures, all of the significant or potentially significant adverse effects associated with the IPM Program would be reduced to a less-than-significant level. No significant and unavoidable impacts would occur with implementation of the IPM Program.

ES.4 SIGNIFICANT IRREVERSIBLE ENVIRONMENTAL CHANGES

Pursuant to Section 15126.2(d) of the State CEQA Guidelines, an EIR must consider any significant irreversible environmental changes that would be caused by a proposed project, should it be implemented. Section 15126.2(d) states: Uses of nonrenewable resources during the initial and continued phases of the project may be irreversible since a large commitment of such resources makes removal or nonuse thereafter unlikely. Primary impacts and, particularly, secondary impacts (such as a highway improvement which provides access to a previously inaccessible area) generally commit future generations to similar uses. Also, irreversible damage can result from environmental accidents associated with the project. Irretrievable commitments of resources should be evaluated to assure that such current consumption is justified. A project would result in potentially significant irreversible environmental changes if:

- the primary and secondary impacts would generally commit future generations to similar uses;
- the project would involve uses in which irreversible damage could result from any potential environmental accidents associated with the project;
- the project would involve a large commitment of nonrenewable resources; or
- the proposed consumption of resources is not justified (e.g. the project involves the wasteful use of energy).

The Authority conserves the natural environment by protecting open spaces, natural areas, and working farms and ranches for future generations through establishing preserves. The IPM Program would guide pest management activities on existing Authority owned and protected preserves and does not propose new types of land uses or new development or infrastructure. Therefore, implementation of the IPM Program would not alter land uses thereby committing future generations to similar uses.

The IPM Program would involve the use of vehicle fuels, oils, lubricants, and pesticides. As discussed in Section 3.4, "Hazards and Hazardous Materials," the Authority would comply with all laws, regulations, and policies relevant to the use, transport, storage, and disposal of hazardous materials to minimize potential health and environmental risks. Additionally, the Authority would incorporate environmental protection measures (EPMs) in the IPM Program to further minimize the potential for impacts to human health and the environment from pesticide use. These EPMs include requirements to minimize spills, properly dispose of pesticide containers, triple rinse pesticide containers, lawfully store and handle pesticides, and dispose of unused pesticides and pesticide containers to adequately safeguard human, fish, and wildlife health and prevent soil and water contamination. Therefore, the potential for environmental accidents to occur resulting in irreversible damage from equipment and pesticide use under the IPM Program would be low.

The IPM Program would result in the commitment of nonrenewable energy resources in the form of fossil fuels for equipment and vehicle use. However, few pieces of mechanical equipment would be utilized during pest management activities and only one or two additional staff are projected to be hired to implement to IPM Program, which would not result in a substantial increase in energy consumption for worker commute. The use of nonrenewable energy resources to implement IPM treatments would be relatively minor and represent only a small portion of the resources available in the region. Furthermore, the minimal consumption of nonrenewable resources associated with the IPM Program would be justified by the benefits that the IPM Program would provide in avoiding pest damage to natural resources, promoting visitor safety and enjoyment, protecting human health, and improving the overall condition of IPM Program Area preserves.

ES.5 GROWTH INDUCING IMPACTS OF THE PROGRAM

State CEQA Guidelines Section 21100(b)(5) specifies that growth-inducing impacts of a project must be addressed in an EIR. Section 15126.2(e) states that a proposed project is growth-inducing if it could "foster economic or population growth, or the construction of additional housing, either directly or indirectly, in the surrounding environment." Included in the definition are projects that would remove obstacles to population growth. Examples of growth-inducing actions include developing water or wastewater treatment facilities, schools, or other types of services in previously unserved areas; extending transportation routes into previously undeveloped areas; and establishing major new employment opportunities.

A project can induce growth directly, indirectly, or both. Direct growth inducement would result if a project involved construction of new housing. Indirect growth inducement would result, for instance, if implementing a project resulted in any of the following:

- substantial new permanent employment opportunities (e.g., commercial, industrial, or governmental enterprises);
- substantial short-term employment opportunities (e.g., construction employment) that indirectly stimulates the need for additional housing and services to support the new temporary employment demand; and/or
- removal of an obstacle to additional growth and development, such as removing a constraint on a required public utility or service (e.g., construction of a major sewer line with excess capacity through an undeveloped area).

The IPM Program would guide pest management activities on existing Authority preserves. No new housing is proposed; thus, the program would not result in direct growth inducement. Only one to two additional staff are projected to be hired to implement to IPM Program, which would not be considered a substantial new permanent or short-term increase in employment. No new facilities, infrastructure, or services are proposed under the IPM Program, and no alterations to existing land uses would occur. Thus, the IPM Program would not result in the extension or expansion of public utilities, establish an essential public service, provide new access to a remote area, change the zoning, or result in any other actions that would remove obstacles to growth. Therefore, implementation of the IPM Program would not result in direct or indirect growth inducement.

ES.6 ALTERNATIVES TO THE PROPOSED PROGRAM

The following provides brief descriptions of the alternatives evaluated in this ~~Draft~~ PEIR:

- **Alternative 1: No Project Alternative** assumes that the Authority would continue to implement manual, mechanical, and chemical IPM activities at the same rate and geographic extent as under existing conditions. The IPM manual would not be approved and the comprehensive IPM Program would not be implemented.
- **Alternative 2: Limited IPM Treatments on Natural Lands Alternative** would prohibit the use of spray herbicides and invasive animal treatment activities on natural lands. Instead, only invasive vegetation would be treated through wicking and cut-stump application of herbicides and manual and mechanical treatments, including pulling, digging, scraping, cutting/mowing, weed whipping, brush cutting, girdling/frilling/drilling, and green flaming. IPM activities on recreational facilities, agricultural lands, and buildings and structures would be the same as those described under the IPM Program.
- **Alternative 3: No Alterations to Buildings Alternative** would prohibit physical building and structure alterations to exclude pests, such as covering openings with plywood or concrete, installing one-way hinged doors, or building retrofits. The Authority would implement all other IPM treatment activities proposed for use in buildings and structures under the IPM Program, including sanitation, pruning of vegetation, use of sticky or snap traps, habitat modifications, and the use of pesticides. All IPM activities on recreational facilities, agricultural lands, and natural lands would be the same as those described under the IPM Program.

ES.7 AREAS OF CONTROVERSY AND ISSUES TO BE RESOLVED

Section 15123(b) of the State CEQA Guidelines requires the summary section of a ~~Draft~~ PEIR to identify areas of controversy known to the Lead Agency, including issues raised by agencies and the public. The Authority issued a Notice of Preparation (NOP) on October 17, 2019 to responsible and trustee agencies, interested parties, and organizations, as well as private organizations and individuals that may have an interest in the project. A public scoping meeting was held on October 29, 2019. The purpose of the NOP and the public scoping meeting was to provide notification that a PEIR for was being prepared for the project and to solicit input on the scope and content of the environmental document. The NOP and public comments received during the scoping period are included in Appendix A of this ~~Draft~~ PEIR. Key environmental concerns and issues that were expressed during the scoping process included the following:

- Use of RoundUp and other herbicides,
- potential impacts on biological and aquatic resources during pest management activities,
- potential impacts on cultural and tribal cultural resources during pest management activities, and
- incorporation of best management practices in the IPM Program.

These issues are addressed in this ~~Draft~~ PEIR.

Table ES-1 Summary of Impacts and Mitigation Measures

Impacts	Significance before Mitigation	Mitigation Measures	Significance after Mitigation
LTS = Less than significant PS = Potentially significant LTSM = Less than significant with mitigation			
Aesthetics			
Impact 3.2-1: Potential to Adversely Affect Scenic Vistas or Substantially Degrade the Existing Visual Character or Quality of Public Views IPM Program treatment activities would consist of manual, mechanical, and chemical treatments targeted for select sites within the IPM Program Area, including structures and buildings, recreational facilities, agricultural lands, and natural lands. Treatments could result in temporary effects to visual quality by the presence of trapping devices, tenting and fumigating buildings and structures, and mechanical equipment in the IPM Program Area. However, IPM treatments would be temporary and short-term, would help re-establish native vegetation patterns, and would not dominate long range or panoramic views. IPM Program treatments would not result in adverse effects on scenic vistas or substantially degrade the visual character or quality of the site and its surrounding. Therefore, this impact would be less than significant.	LTS	No mitigation is required	LTS
Biological Resources			
Impact 3.3-1: Potential to Substantially Affect Special-Status Plants Implementation of the IPM Program on agricultural lands and within structures and buildings would not result in any adverse effects on special-status plants due a lack of suitable habitat in those areas. Implementation of the IPM Program in the vicinity of structures and buildings for ground squirrel control and on recreation facilities and natural lands has the potential to result in adverse effects on special-status plants if present; however, implementation of EPMs would avoid and minimize impacts to special-status plants through pre-treatment surveys and avoidance buffers around identified special-status plants. Therefore, the impact would be less than significant.	LTS	No mitigation is required	LTS
Impact 3.3-2: Potential to Substantially Affect Special-Status Wildlife Species Implementation of IPM Program activities may result in the injury, mortality, or disruption of reproduction of special-status invertebrates, special-status fishes, special-status amphibians, special-status reptiles, special-status birds, special-status mammals, and loss of nests of common raptors and other nesting birds. After considering the implementation of applicable EPMs, the impact to special-status wildlife species would be potentially significant.	PS	**Mitigation Measure 3.3-2a: Avoid Loss of Bay Checkerspot Butterfly and Host Plants** ▸ The Authority will obtain take coverage for Bay checkerspot butterfly under the Habitat Plan for covered activities (i.e., manual and mechanical treatments). The Authority will implement all applicable permit conditions required by the Habitat Plan to avoid and minimize injury, death, disturbance, or habitat degradation for this special-status species. If take coverage is not obtained for manual and mechanical activities, the Authority will implement the following measures:	LTSM

Impacts	Significance before Mitigation	Mitigation Measures	Significance after Mitigation
LTS = Less than significant PS = Potentially significant LTSM = Less than significant with mitigation			
		▪ EPM BIO-2 and EPM BIO-4 shall be implemented for Bay checkerspot butterfly host plant species (dwarf plantain and purple owl's clover). Per these EPMs, the Authority will conduct pre-treatment surveys for dwarf plantain and purple owl's clover and flag and/or map and avoid all occurrences during manual and mechanical treatments. When the host plants are dormant, only manual and mechanical treatment activities that do not affect seeds or underground parts shall be used within 15 feet of dwarf plantain and purple owl's clover occurrences. ▸ If pyrethrin-type spray insecticides are proposed for use (e.g., on a wasps' nest) within Bay checkerspot butterfly suitable habitat, they shall be applied by a qualified biologist with experience identifying Bay checkerspot butterfly. Prior to any application, a visual survey will be conducted within 15 feet of the application site. If dwarf plantain and purple owl's clover are observed within 15 feet of a target wasps' nest, no pyrethrin-type spray insecticides will be used unless it is confirmed no Bay checkerspot butterfly eggs or larvae are present, and only immediately following the absence determination. If adult Bay checkerspot butterflies are found during the survey, no pyrethrin-type spray insecticides will be used until the butterflies have left the 15-foot buffer on their own. ▸ If broadcast spraying (i.e., from a boom on an ATV) of herbicides is proposed for use within Bay checkerspot butterfly suitable habitat, EPM BIO-2 through EPM BIO-5 will be implemented. These measures will require identification, flagging, and avoidance of dwarf plantain and purple owl's clover and prohibit the broadcast spraying of non-selective herbicides (i.e., herbicides that injure all plant species that are directly exposed to the herbicide) within 15 feet of dwarf plantain and purple owl's clover. Non-selective herbicides will only be broadcast sprayed in suitable habitat if it is applied during the dormant period of dwarf plantain and purple owl's clover (July through February) and does not damage seeds or underground parts.	
		Mitigation Measure 3.3-2b: Avoid Loss of Crotch Bumble Bee Nest Colonies ▸ To avoid direct disturbance of Crotch bumble bee nest colonies, if ground disturbing treatments (e.g., digging, scraping, hoeing, <u>rodent burrow removal,</u> installation of exclusion fencing for feral pigs or bullfrogs), use of weedmats, or pyrethrin-type insecticide treatments are proposed in Crotch bumble bee suitable habitat during the period when nest colonies may be present (March	LTSM

Impacts	Significance before Mitigation	Mitigation Measures	Significance after Mitigation
LTS = Less than significant PS = Potentially significant LTSM = Less than significant with mitigation			
		through September), prior to implementing treatments, the Authority will conduct field surveys within treatment sites for the presence of the species. ▪ Surveys to determine occupancy of suitable habitat by Crotch bumble bee will occur within 1 year prior to treatment implementation and at four evenly spaced sampling periods within the flight season (March through September). Surveys will follow the general procedures in the USFWS' Survey Protocols for the Rusty Patched Bumble Bee (*Bombus affinis*) (USFWS 2018). Surveys will use non-lethal netting methods for one (1) person-hour per 3 acres of the treatment site or until 150 bumble bees are sighted, whichever comes first. If no Crotch bumble bees are detected, then no further survey of that treatment area or further mitigation is required. Alternatively, the Authority may assume presence within suitable habitat, and apply only the additional measure below. ▪ If Crotch bumble bees are detected within the treatment area, or presence is assumed, and ground disturbing treatments (e.g., digging, scraping, hoeing, installation of exclusion fencing for feral pigs or bullfrogs), weed mats, or use of pyrethrin-type spray insecticides are planned; a pre-treatment survey will occur within 30 days of the treatment to identify the location of active nest colonies. ▪ Crotch bumble bee nest colonies detected within the treatment area will be flagged and no ground disturbing treatments, weed mats, or pyrethrin-type spray insecticides will be used within 15 feet of the colony during March through September, or until the colony is no longer active (i.e., no bees are seen flying in or out of the nest for three consecutive days). Air space shall be maintained between the active nest colony and nectar resources to facilitate foraging. ▸ To avoid loss of Crotch bumble bee nest colonies through removal of floral resources, within occupied habitat (presence can be assumed or follow survey requirements above to determine occupancy), mechanical vegetation removal and spraying of non-selective herbicide treatments will be conducted such that the entirety of floral resources are not removed during the period when colonies may be present (March through September), and untreated portions of occupied habitat are retained adjacent to treatment areas to provide floral resources and refuge for Crotch bumble bees.	

Impacts	Significance before Mitigation	Mitigation Measures	Significance after Mitigation
LTS = Less than significant PS = Potentially significant LTSM = Less than significant with mitigation			
		▸ If in the future Crotch bumble bee is listed under the CESA and take is not covered under the Valley Habitat Plan, the Authority will consult with CDFW to determine additional measures that may be required to avoid take of individuals, or will apply for an Incidental Take Permit. Additional measures may include, but are not limited to, further limitations on the use of pyrethrin-type spray insecticides and mechanical treatment during the flight season, and limitations on ground disturbing treatments in overwintering habitat. If agreement is reached, the Authority shall implement all measures developed in consultation with CDFW.	
		Mitigation Measure 3.3-2c: Avoid Injury or Loss of Special-Status Fishes ▸ The Authority will not conduct trapping, shooting, gigging, or electroshocking during the spawning season for Monterey roach (March through June) within suitable habitat (i.e., perennial streams). Shooting, trapping, gigging, and electroshocking of aquatic species will only be conducted by a qualified biologist with experience identifying special-status fishes.	LTSM
		Mitigation Measure 3.3-2d: Avoid Impacts to California Tiger Salamander and California Red-Legged Frog ▸ The Authority will obtain take coverage for California tiger salamander and California red-legged frog for covered IPM activities (i.e., manual and mechanical treatments). The Authority will implement all applicable permit conditions required by the Habitat Plan to avoid and minimize injury, death, disturbance, or habitat degradation for these special-status species. If take coverage is not obtained for manual and mechanical activities, the Authority will implement the following measures: ▪ Conduct field surveys within treatment sites to determine the presence of suitable California tiger salamander and California red-legged frog habitat. ▪ Prohibit burrow ~~ripping~~ removal for ~~ground squirrel~~ rodent control where suitable California tiger salamander upland habitat is present to avoid harming individual California tiger salamanders that may be present in empty burrows. ▪ Prohibit mechanical and chemical treatments in suitable California tiger salamander upland habitat during the wet season (generally October 15 through May), and within 24 hours of rainfall. Only manual IPM	LTSM

Impacts	Significance before Mitigation	Mitigation Measures	Significance after Mitigation
LTS = Less than significant PS = Potentially significant LTSM = Less than significant with mitigation			
		treatment activities shall be conducted in suitable upland habitat during the wet season to avoid injury or mortality of these species during overland movement. ▪ Prior to conducting IPM treatments in California tiger salamander or California red-legged frog suitable habitat that could result in incidental injury or death of individuals as determined by a qualified biologist (e.g., mechanical treatments that use large, ground disturbing equipment such as tractor-operated mowers), and within 14 days of treatment, pre-treatment clearance surveys shall be conducted. If individuals of either species are found within a treatment site during pre-treatment clearance surveys, monitoring shall be conducted during the treatment (with the exception of pond draining as discussed below). If California tiger salamander or California red-legged frog individuals are found within a treatment site while work is occurring, work shall stop until the individuals are no longer at risk of incidental injury or death from the implementation of the treatment or have left the treatment area without assistance. ▪ Pond draining shall not occur during the breeding period for California tiger salamander or California red-legged frog (generally October 15 through May). In addition, prior to draining any pond, protocol surveys will be conducted by a qualified biologist. Draining of the pond shall only proceed once surveys confirm that no California tiger salamanders, California red-legged frogs, or egg masses are present. ▸ Prior to the use of herbicides, the Authority will conduct field surveys within treatment sites for the presence of suitable aquatic and upland habitat for California tiger salamander and California red-legged frog. If suitable aquatic or upland habitat is identified, the Authority will implement the following measures: ▪ No broadcast spraying of herbicides will occur within 50 feet of suitable California tiger salamander or California red-legged frog aquatic habitat and no application of herbicides by any method will occur within 15 feet of California tiger salamander or California red-legged frog aquatic habitat.	

Impacts	Significance before Mitigation	Mitigation Measures	Significance after Mitigation
LTS = Less than significant PS = Potentially significant LTSM = Less than significant with mitigation			
		▪ Within 50 feet of suitable California tiger salamander or California red-legged frog upland habitat, no broadcast spraying of herbicides (i.e., boom on an ATV) will occur during the wet season (generally October 15 through May), or within 24 hours of rainfall, to avoid direct exposure to California tiger salamander or California red-legged frog. Targeted, handheld application of herbicides may occur outside of this window within 50 feet of California red-legged frog upland habitat or California tiger salamander upland habitat by staff trained to identify and avoid any potential burrows and burrow openings. ▪ When using herbicides that contain the active ingredients that are subject to the herbicide injunction for California red-legged frog (Center for Biological Diversity v. U.S. Environmental Protection Agency [2006] Case No.: 02-1580-JSW) the requirements of that injunction shall apply (see EPM BIO-8). ▪ Alternatively, if it is not feasible to meet the objectives of the IPM Program under these requirements for herbicide use, the Authority will consult USFWS and/or CDFW before implementation of herbicide application to develop measures to avoid the injury, death, or disturbance of California tiger salamander and California red-legged frog. These measures may include, but are not limited to, limitations on the types of herbicides used and restrictions on the timing of use. If agreement is reached, the Authority shall implement all measures developed in consultation with the agencies.	
		Mitigation Measure 3.3-2e: Avoid Impacts to Foothill Yellow-Legged Frog ▸ the Authority will obtain take coverage for foothill yellow-legged frog for all IPM activities under the Habitat Plan (all activities including chemical treatments are covered by the Habitat Plan for foothill yellow-legged frog). The Authority will implement all applicable permit conditions required by the Habitat Plan to avoid and minimize injury, death, disturbance, or habitat degradation for this special-status species. If take coverage is not obtained, the Authority will implement the following the following measures: ▪ Conduct field surveys within treatment sites for the presence of suitable foothill yellow-legged frog habitat.	LTSM

Impacts	Significance before Mitigation	Mitigation Measures	Significance after Mitigation
LTS = Less than significant PS = Potentially significant LTSM = Less than significant with mitigation			
		▪ The Authority will not broadcast spray herbicides within 50 feet of suitable aquatic or upland habitat and no application of herbicides by any method will occur within 15 feet of suitable aquatic habitat of foothill yellow-legged frog. Alternatively, if it is not feasible to meet the objectives of the IPM Program under these requirements for herbicide use, the Authority will consult CDFW to develop measures to avoid incidental injury or death of the species. These measures may include but are not limited to, limitations on the types of herbicides used and timing of use. If agreement is reached, the Authority shall implement all measures developed in consultation with CDFW. ▪ Prior to conducting IPM treatments in foothill yellow-legged frog suitable habitat that could result in incidental injury or death of individuals as determined by a qualified biologist (e.g., mechanical treatments that use large, ground disturbing equipment such as tractor-operated mowers), and within 14 days of treatment, pre-treatment clearance surveys shall be conducted. If individuals are found within a treatment site during pre-treatment surveys, monitoring shall be conducted during treatment. If foothill yellow-legged frogs are found within a treatment site while work is occurring, work shall stop until the individual is no longer at risk of incidental injury or death from the implementation of the treatment, or until the individual is moved outside of the treatment site by a qualified biologist.	
		Mitigation Measure 3.3-2f: Preconstruction Surveys and Avoidance of California Giant Salamander, Coast Range Newt, and Santa Cruz Black Salamander ▸ Prior to conducting IPM treatments in California giant salamander, coast range newt, and Santa Cruz black salamander suitable habitat that could result in incidental injury or death of individuals (e.g., mechanical treatments that use large, ground disturbing equipment such as tractor-operated mowers) as determined by a qualified biologist, and within 14 days of treatment, pre-treatment clearance surveys shall be conducted. ▸ If individuals of these species are found within a treatment site during pre-treatment clearance surveys, monitoring shall be conducted during treatment. If California giant salamander, coast range newt, or Santa Cruz black salamander are found within the treatment site while work is occurring, work shall stop until the individual is no longer at risk of incidental injury or death	LTSM

Impacts	Significance before Mitigation	Mitigation Measures	Significance after Mitigation
LTS = Less than significant PS = Potentially significant LTSM = Less than significant with mitigation			
		from the implementation of the treatment, or until the individual is moved outside of the treatment site by a qualified biologist.	
		Mitigation Measure 3.3-2g: Avoid Impacts from Aquatic-based IPM Treatments to Special Status Amphibians ▶ Exclusion fencing, trapping, gigging, shooting, and electroshocking in aquatic environments shall be conducted by a qualified biologist with experience in the identification of amphibian species and possessing the appropriate federal and state permits to handle listed species. Inadvertently trapped or shocked special-status amphibians will be released immediately upon discovery.	LTSM
		Mitigation 3.3-2h: Avoid Injury or Loss of Special-Status Reptiles ▶ The Authority will obtain take coverage for western pond turtle under the Habitat Plan. The Authority will implement all applicable permit conditions that may be required by the Habitat Plan to avoid and minimize impacts to western pond turtle. ▶ For special-status reptiles that are not covered by the Habitat Plan (and for western pond turtle if Habitat Plan take coverage is not obtained), the Authority will implement the following avoidance and minimization measures prior to conducting IPM treatment activities that have the potential to injure or harm special-status reptiles: ▪ Conduct assessment of treatment sites for the presence of suitable special-status reptile habitat. Prior to scraping/grubbing, ripping, <u>rodent burrow ripping,</u> mechanical treatments, or tree removal within suitable habitat for special-status reptiles, and within 30 days of treatment, the Authority will survey the treatment site for the presence of special-status reptiles (and western pond turtle nests, if applicable). If special-status reptiles are found within the treatment site, monitoring for special-status reptiles will be conducted during the treatment and work will stop if a special-status reptile is at risk of injury until it is no longer at risk. Special-status reptiles (except for Alameda whipsnake) may be moved outside of the treatment area by a qualified biologist. Any western pond turtle nests will be flagged and avoided (if applicable). ▪ Prior to conducting IPM treatment activities within occupied habitat for Alameda whipsnake, the Authority shall consult USFWS on any activities that may result in injury, death, or disturbance of the species to develop	LTSM

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		measures to avoid these impacts. Additional measures may include but are not limited to surveys, monitoring, and seasonal restrictions on use of pesticides and other treatments. If avoidance is not feasible then the Authority will not conduct IPM treatment activities that would cause impacts to Alameda whipsnake. ▪ Shooting, trapping, gigging, and electroshocking of aquatic species, and trapping of rattlesnakes, will be conducted by a qualified biologist with experience in the identification of special-status reptile species. Inadvertently trapped special-status reptiles will be released immediately upon discovery. Trapping for rattlesnakes shall not be conducted within the range of Alameda whipsnake.	
		Mitigation 3.3-2i: Avoid Loss of Special-Status Birds, Nests, and Nesting Colonies ▸ The Authority will obtain take coverage for least Bell's vireo under the Habitat Plan for covered activities (i.e., manual and mechanical treatments). The Authority will implement all applicable permit conditions that may be required by the Habitat Plan to avoid and minimize impacts to least Bell's vireo. In occupied habitat for least Bell's vireo (or in suitable habitat if occupancy is not known), the Authority will not use chemical treatments without prior consultation with USFWS. ▸ The Authority will obtain take coverage for tricolored blackbird and burrowing owl under the Habitat Plan. The Authority will implement all applicable permit conditions required by the Habitat Plan. ▸ If take coverage under the Habitat Plan is not obtained for covered special-status birds before covered activities are implemented, the Authority will implement the following avoidance and minimization measures: ▪ Treatment activities within 250 feet of riparian habitat suitable for least Bell's vireo nesting will occur outside of the least Bell's vireo breeding season (defined as March 15 through September 15) to the extent feasible. If work must occur within 250 feet of riparian habitat within the breeding season, a qualified biologist will conduct visual and audio surveys for nesting least Bell's vireo according to the Least Bell's Vireo Survey Guidelines (USFWS 2001) or as approved by USFWS. Vocalization recordings will not be used. In the event that least Bell's vireo territory or active nests are confirmed during the surveys, the biologist will establish	LTSM

Impacts	Significance before Mitigation	Mitigation Measures	Significance after Mitigation
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		an avoidance buffer zone between the territory edge and investigation activities at a distance recommended by USFWS. The Authority will periodically monitor active territories and maintain the territory avoidance buffer zone until nestlings have fledged and are no longer reliant on the nest or parental care for survival or until the nest is abandoned (as determined by a qualified biologist). ▪ Prior to conducting treatments in burrowing owl habitat, the Authority will conduct a survey of the treatment site for burrowing owl burrows. If an active burrow is identified near a treatment site and work cannot be conducted outside of the nesting season (February 1 to August 31), a qualified biologist will establish an avoidance buffer that extends 150 to 1,500 feet around the burrow, depending on nesting stage and level of disturbance. If burrowing owls are present at the treatment site during the non-breeding season (September 1 through January 31), a qualified biologist will establish an avoidance buffer that extends a minimum of 150 feet around the burrow. ▪ IPM Program activities that occur within 250 feet of suitable tricolored blackbird nesting colony habitat will be conducted outside of the breeding season (March 15 through September 31). If work must occur within 250 feet of suitable tricolored blackbird nesting colony habitat during breeding season, then a protocol survey for tricolored blackbird nests will be conducted. If a nesting colony is present, then no IPM activities will occur within 250 feet of the colony until the colony has dispersed. Vegetation that has been documented to be used for nesting by tricolored blackbird shall not be removed for a period of 5-years following the use of the vegetation for nesting. ▸ Within Swainson's hawk nesting habitat, the Authority will survey for active nests prior to the implementation of any IPM Program activities. If nests are identified, IPM Program activities would be prohibited within 0.25 mile of the active nest during nesting season (March 1 - September 15). This buffer may be adjusted as appropriate by a qualified biologist in consultation with CDFW. If removal of a Swainson's hawk nest tree is required, the Authority shall conduct removal of the tree outside of the active nesting season in coordination with CDFW.	

Impacts	Significance before Mitigation	Mitigation Measures	Significance after Mitigation
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		▸ For all other special-status bird species, the Authority will apply EPM BIO-6 and EPM BIO-7 to trapping, gigging, shooting, and electroshocking activities for bullfrog and invasive fish removal. This would require that trapping, gigging, shooting, and electroshocking activities for bull frog and invasive fish removal occur outside of the nesting season, or requires a nesting bird survey if activities would occur within the nesting season and non-disturbance buffers would be implemented. ▸ Brown-headed cowbird trapping shall be conducted by a qualified biologist with experience in the identification of bird species. Inadvertently trapped special-status birds will be released immediately upon discovery. Prior to initiating trapping, the Authority will consult CDFW and USFWS regarding trapping within 250 feet of special-status bird species habitat.	
		Mitigation Measure 3.3-2j: Avoid Injury and Loss of San Joaquin Kitfox ▸ The Authority will obtain take coverage for San Joaquin kitfox under the Habitat Plan for covered activities (i.e., manual and mechanical treatments). The Authority will implement all applicable permit conditions required by the Habitat Plan. ▸ Prior to the application of pesticides within suitable habitat for San Joaquin kitfox, the Authority will consult with USFWS to determine the appropriate measures to avoid injury, death, or disturbance to the species due to pesticides. The Authority will implement all conservation measures developed with USFWS such as restrictions on pesticide use. ▸ If take coverage under the Habitat Plan is not obtained before IPM Program activities are implemented within suitable habitat for San Joaquin kitfox, the Authority will implement the following avoidance and minimization measures: ▪ Prior to implementing IPM Program activities that could disturb San Joaquin kitfox dens, such as mowing, <u>rodent burrow removal,</u> grubbing/clearing, and tree removal within suitable habitat for San Joaquin kitfox, the Authority will survey for dens within a buffer of 200 feet around treatment sites. If potential dens are found during surveys, a non-disturbance buffer of not less than 100 feet will be maintained around the den site for the duration of treatment activities. If a natal den is discovered within 200 feet of a treatment site, all activity shall cease,	LTSM

Impacts	Significance before Mitigation	Mitigation Measures	Significance after Mitigation
LTS = Less than significant PS = Potentially significant LTSM = Less than significant with mitigation			
		and the Authority will contact the USFWS and CDFW to consult about potential avoidance measures before activities can occur (USFWS 2011). ▪ No trapping of feral pets would occur within suitable habitat for San Joaquin kitfox, unless the Authority conducts surveys and determines that the suitable habitat is unoccupied in consultation with USFWS.	
		Mitigation Measure 3.3-2k: Avoid Injury and Loss of American Badger and Ringtail ▸ No more than 14-days prior to implementation of IPM Program activities that could disturb American badger and ringtail dens, such as herbicide application, mowing, grubbing/clearing, rodent burrow removal, and tree removal within suitable habitat, a qualified biologist shall conduct pre-treatment surveys within 100 feet of treatment project sites for potential American badger and ringtail dens. ▸ If any potentially occupied American badger dens are located during surveys, no work shall be performed within a 50-foot buffer around each den during the non-breeding season or within a 100-foot buffer around dens during the period when pups are potentially in the den (February 15 through July 1). ▸ If any potentially occupied ringtail dens (e.g., brush piles, appropriately sized burrows, hollow logs, hollow trees) are located during surveys, the same buffers as described for American badger during non-breeding and breeding season (May 1 through June 30) shall be implemented. ▸ Feral pet trapping within suitable habitat for American badger shall be conducted by a qualified biologist with experience in the identification of American badger. Inadvertently trapped special-status species, including American Bader, will be released immediately upon discovery. ▸ Feral pet trapping within suitable habitat for ringtail shall be conducted by a qualified biologist with experience in the identification of ringtail. Inadvertently trapped special-status species, including ringtail, will be released immediately upon discovery. Prior to initiating trapping in suitable ringtail habitat, the Authority will consult CDFW to confirm trapping methods are sufficient in avoiding potential injury to ringtail.	LTSM
		Mitigation Measure 3.3-2l: Avoid Injury and Loss of Mountain Lion ▸ The Authority shall conduct desktop analyses (e.g., review of land cover, slope, distance from development), coordination with local experts studying or tracking the species (if available), and field habitat surveys to determine the	LTSM

Impacts	Significance before Mitigation	Mitigation Measures	Significance after Mitigation
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		presence of nursery habitat suitable for mountain lion within preserves where treatments may occur. The desktop analysis shall be updated as habitat conditions or species occurrence information changes. ▸ Where the desktop analysis determines that suitable nursery habitat is present, the Authority will conduct focused surveys of the treatment area and a 2,000-foot buffer for the presence of potential mountain lion nurseries. Surveys will be conducted within 7 days before commencement of treatment activities by a qualified wildlife biologist with familiarity with mountain lion and experience using survey methods for the species. Potential mountain lion dens will include caves, large natural cavities within rocky areas, or thickets deemed appropriate for use by mountain lions based on size and other characteristics (e.g., proximity to human development, surrounding habitat, and coordination with local experts to determine known locations of female mountain lions). The qualified wildlife biologist will survey for signs of mountain lion (e.g., tracks, scat, prey items such as a fresh kill) in the vicinity of potential nursery habitat to help determine whether the area may contain a mountain lion nursery. If signs of a mountain lion nursery are observed, further investigation will be required to determine if a mountain lion nursery is present (see below). ▸ If signs of a mountain lion nursery are found during surveys, further investigation will be required to determine if a mountain lion nursery is present. No treatment will occur in the area while further investigation is occurring. Survey methods will include the use of trail cameras, track plates, hair snares, and/or other noninvasive methods, as well as coordination with local experts tracking the species (if available). Surveys using these noninvasive methods will be conducted for three days and three nights to determine whether a nursery may be present. ▸ If a nursery is known to occur in the area or further signs of a nursery are detected (e.g., lactating adult females or kittens on camera, repeated detections of an adult female in the area, growls or calls from kittens), the Authority will implement a no-disturbance buffer of at least 2,000 feet (Wilmers et al. 2013) for a minimum of 10 weeks. Treatment activities will not occur within this buffer during this time to avoid disturbance, injury, or mortality of mountain lion.	

Impacts	Significance before Mitigation	Mitigation Measures	Significance after Mitigation
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		▸ Feral pet trapping within suitable habitat for mountain lion shall be conducted by a qualified biologist with experience in the identification of mountain lion cubs. Inadvertently trapped special-status species, including mountain lion individuals, will be released immediately upon discovery. Prior to initiating trapping in suitable mountain lion habitat, the Authority will consult CDFW to confirm trapping methods are sufficient in avoiding potential injury to mountain lion individuals.	LTSM
		Mitigation 3.3-2m: Minimize Loss of San Francisco Dusky-Footed Woodrat Nests ▸ The Authority will survey for the presence of San Francisco dusky-footed woodrat nests within areas proposed for mechanical vegetation removal. The locations of nests shall be recorded, and nests flagged for avoidance by treatment activities. ▸ The Authority will consult with CDFW in areas where ~~vegetation~~ treatments would result in destruction or removal of a nest. Management actions shall be determined in consultation with CDFW and may include the live capture and relocation of woodrats to suitable adjacent habitats and the dismantling of nests. If consultation determines that nest dismantling may occur, nests shall be dismantled by hand under the supervision of a biologist. If young are encountered during the dismantling process, the material shall be placed back on the nest, and the nest shall remain undisturbed for two to three weeks to give the young enough time to mature and leave the nest on their own accord. After two to three weeks, the empty nest may be dismantled. Nest material shall be moved to suitable adjacent areas within suitable habitat that shall not be disturbed. As woodrats exhibit high site fidelity, buildings with previous woodrat nests shall be regularly inspected for potential intrusion to prevent infestation.	LTSM
		Mitigation 3.3-2n: Avoid Loss of Special-Status Bat Roosts ▸ If exclusion of bats or fumigation is necessary in buildings and structures during the nursery season (April through August), a qualified biologist will conduct surveys for roosting bats. Surveys shall consist of daytime pedestrian surveys to look for visual signs of bats (e.g., guano), and if determined necessary, evening emergence surveys to note the presence or absence of bats. If evidence of bat roosting is found, the number and species of roosting bats will be determined. When special-status bat roosting sites are located in	

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		buildings, exclusion of bats and fumigation shall occur outside of the April through August nursery season. ▸ The Authority shall not remove trees greater than 16 inches diameter at breast height (dbh) during the April through August nursery season, unless a qualified biologist conducts surveys for roosting bats where suitable large trees are to be removed. Surveys will consist of daytime pedestrian surveys to look for visual signs of bats (e.g., guano), and if determined necessary, evening emergence surveys to note the presence or absence of bats. If evidence of special-status roosting bats is found, removal of trees where potential special-status bat roosts are identified shall occur outside of the nursery season. If no evidence of special-status bat roosts is found, then the Authority may move forward with tree removal.	
Impact 3.3-3: Potential to Substantially Affect Riparian Habitat or Other Sensitive Natural Communities Identified by CDFW or USFWS Implementation of the IPM Program may occur within or adjacent to riparian and other sensitive natural communities. However, manual and mechanical IPM Program treatments that would be implemented for the removal of invasive plants and animals would not substantially affect riparian habitat or other sensitive natural communities due the limited size and short duration of disturbances. These activities would not change the community type or habitat function of a community, and the areas that would be treated would not be so large such that a significant reduction in acreage of these communities would result. Furthermore, the Authority would implement EPMs that would prohibit ground disturbing mechanical treatments and all chemical treatments within 15 feet of aquatic resources, and prohibit the broadcast spraying of herbicides within 50 feet of aquatic features (unless the compound is specifically registered for aquatic use) (EPM BIO-1). this would reduce impacts where riparian vegetation is present. Also, measures minimizing the potential for herbicide drift or runoff into surrounding areas would be implemented (EPM HAZ-5), which would reduce the potential for herbicides to enter non-target areas such as riparian areas and other sensitive natural communities. Therefore, the impact would be less than significant.	LTS	No mitigation is required	LTS

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Impact 3.3-4: Potential to Substantially Affect State or Federally Protected Wetlands or Other Waters IPM Program treatments that are conducted near aquatic resources may result in runoff of sediment and pesticides to potentially protected wetlands and other waters. In addition, aquatic invasive animal control under the IPM Program would result in temporary fill and dewatering of potentially protected state and federal wetlands and other waters. However, the Authority would implement EPMs that require pre-treatment surveys for aquatic resources, prohibit ground disturbing mechanical treatments or any chemical treatments within 15 feet of aquatic resources, and prohibit the broadcast spraying of herbicides within 50 feet of aquatic features (unless the compound is specifically registered for aquatic use) (EPM BIO-1); require specific methods for safe handling of all pesticides and to minimize accidental spills (EPM HAZ-4); and limit herbicide applications during high winds or precipitation to minimize the potential for herbicide drift or off-site runoff (EPM HAZ-5). These EPMs would minimize the potential for water quality effects from manual, mechanical, and chemical treatments and no substantial degradation would occur. In addition, prior to conducting aquatic invasive animal control, the Authority would obtain all necessary permits prior to conducting activities within any state or federally protected waters, including a Clean Water Act Section 404 permit and Section 401 water quality certification. For permitted activities occurring in protected waters, the Authority would be required to meet a standard of no net loss of amount or function of wetlands or other waters. Therefore, the IPM Program would not substantially affect protected wetlands or other waters and the impact would be less than significant.	LTS	No mitigation is required	LTS
Impact 3.3-5: Potential to Conflict with Local Policies or Ordinances Protecting Biological Resources Portions of the IPM Program Area are within San Jose, Morgan Hill, and Santa Clara County and various policies and ordinances protection biological resources would apply to the IPM Program. The potential for adverse effects to special-status species, sensitive communities and riparian habitats, and protected waters are addressed in Impact 3.3-1, 3.3-2, and 3.3-3 respectively. Because the IPM Program would not result in any significant and unavoidable effects to any of these resources, it would be consistent with the protections required by each jurisdiction. Furthermore, although each jurisdiction has ordinances specific to tree removal because tree removal under the IPM Program would be limited to hazard trees on	LTS	No mitigation is required	LTS

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Authority-owned public lands, it would be exempt from the Santa Clara County tree ordinance, and the San Jose and Morgan Hill ordinances do not apply to public lands. For these reasons there would be no conflicts with local policies or ordinances protecting biological resources and the impact would be less than significant.			
Impact 3.3-6: Potential to Conflict with the Provisions of the Santa Clara Valley Habitat Plan The IPM Program Area falls within the Plan Area for the Habitat Plan, which is a habitat conservation plan and a natural community conservation plan. The implementation of the IPM Program would not result in loss of open space or substantially adversely affect riparian or sensitive natural communities that would cause a conflict with the Habitat Plan. The EPMs and mitigation measures described throughout this section would minimize and avoid impacts to sensitive biological resources during IPM Program implementation. Furthermore, by maintaining open space preserves within the IPM Program Area, the Authority is conserving high quality habitat and natural ecosystems consistent with the objectives of the Habitat Plan. Therefore, IPM Program would not conflict with the provisions of the Habitat Plan and the impact would be less than significant.	LTS	No mitigation is required	LTS
Cultural and Tribal Cultural Resources			
Impact 3.6-1: Potential to Cause a Substantial Adverse Change in the Significance of a Historic Resource There are multiple previously recorded historic period resources within the IPM Program Area, and additional historic period resources may be present that have not been previously recorded. The IPM Program includes treatment activities that could alter existing buildings and structures within the IPM Program Area, such as through installing barriers to prevent pest entry and conducting building retrofits. Buildings and structures within the IPM Program receiving these treatments could be eligible for listing in the CRHR and therefore considered historic. Incorporating barriers or building retrofits to historic buildings or structures could change their historical significance. Therefore, this would be a potentially significant impact.	PS	**Mitigation 3.6-1: Built-Environment Survey** Before implementation of IPM treatment activities that could alter historic-age buildings or structures (50 years or older), the structures shall be surveyed by a qualified architectural historian who meets the Secretary's Standards. The structure will be evaluated for eligibility for listing on the CRHR. If the structure is evaluated and deemed not eligible for listing on the CRHR, IPM Program treatment activities may proceed. If structures are determined to be eligible for the CRHR, IPM Program activities will follow the Secretary's Standards for the Treatment of Historic Properties with Guidelines for Preserving, Rehabilitating, Restoring, and Reconstructing Historic Buildings, or the Secretary's Standards for Rehabilitation and Guidelines for Rehabilitating Historic Buildings. If the Authority is unable to implement the Secretary's Standards, then no building alterations to structures deemed eligible for listing on the CRHR shall occur.	LTSM

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Impact 3.6-2: Potential to Cause a Substantial Adverse Change in the Significance of Unique Archaeological Resources Archaeological resources have been identified within the IPM Program Area, and there is a potential for unknown archaeological resources to occur within IPM Program Area preserves, any of which could be eligible for the CRHR and thus considered unique archaeological resources. Ground-disturbing manual and mechanical activities proposed under the IPM Program could result in discovery or damage of unique archaeological resources if present, as defined in State CEQA Guidelines Section 15064.5. This would be a potentially significant impact.	PS	**Mitigation Measure 3.6-2a: Records Search and Survey Before Ground Disturbance for Archaeological Resources** An archaeological and historical resource record search will be conducted prior to implementing ground disturbing IPM treatments on added preserves for which a records search is not available. Once the exact locations of ground disturbing IPM treatment activities have been determined and before commencement, the cultural records shall be consulted and a qualified archaeologist shall conduct pedestrian surveys in areas where previously recorded archaeological resources have been identified. In the event of a surface find, materials will be evaluated and recorded on standard Department of Parks and Recreation primary record forms (DPR 523) in accordance with national and state criteria. A determination of eligibility/ineligibility for the CRHR will be recommended for any surface finds. A survey report shall be completed by the qualified archaeologist and will include recommendations for minimizing potential adverse effects to any archaeological resource finds. The Authority shall follow recommendations identified in the report, which may include activities such as subsurface testing, implementing a Worker Environmental Awareness Program, flagging and complete avoidance of sites, construction monitoring by a qualified archaeologist, or notification of the geographically and culturally affiliated Native American tribe to extend an invitation for construction monitoring. If no archaeological resources are found during the pedestrian survey, the proposed IPM activities may proceed.	LTSM
		Mitigation Measure 3.6-2b: Halt Ground Disturbance Upon Discovery of Subsurface Archaeological Features In the event that any surface or subsurface archaeological features or deposits, including locally darkened soil ("midden") that could conceal cultural deposits are discovered, all ground-disturbing activity within 100 feet of the find shall be halted and a qualified professional archaeologist shall be retained to assess the significance of the find. If the archaeologist determines that the find does not meet the CRHR standards of significance for cultural resources, IPM activities may proceed. If the qualified archaeologist determines the archaeological material to be Native American in nature, the Authority shall contact the appropriate Native American tribe for their input on the preferred treatment of the find. If the archaeologist determines that further information is needed to evaluate significance, a data recovery plan shall be prepared. If the find is determined to be significant by the archaeologist (i.e., because it is determined to constitute a unique	LTSM

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		archaeological resource), the archaeologist shall develop, and the Authority shall implement, appropriate procedures to protect the integrity of the resource and ensure that no additional resources are affected. Procedures could include but would not necessarily be limited to preservation in place (which shall be the preferred manner of mitigating impacts to archaeological sites), archival research, subsurface testing, or contiguous block unit excavation and data recovery (when it is the only feasible mitigation, and pursuant to a data recovery plan).	
Impact 3.6-3: Potential to Disturb Human Remains The records search conducted for the IPM Program noted the presence of a burial site within the IPM Program Area and ground-disturbing IPM treatment activities could uncover previously unknown human remains. If human remains are discovered during IPM treatments, the Authority would comply with California Health and Safety Code Sections 7050.5 and 7052 and California Public Resources Code Section 5097 regarding the treatment of human remains. Therefore, the impact would be less than significant.	LTS	No mitigation is required	LTS
Impact 3.6-4: Potential to Cause a Substantial Adverse Change in the Significance of a Tribal Cultural Resource Although no Native American tribes requested consultation pursuant to AB 52, the SLF search conducted by the NAHC for the IPM Program returned positive results and Native American tribes have previously inhabited portions of the IPM Program Area; therefore, there is a potential for tribal cultural resources to be present in the IPM Program Area. Ground-disturbing manual and mechanical activities proposed under the IPM Program could result in the inadvertent discovery or damage of unknown tribal cultural resources, if present. This would be a potentially significant impact.	PS	**Mitigation Measure 3.6-2a: Records Search and Survey Before Ground Disturbance for Archaeological Resources** **Mitigation Measure 3.6-2b: Halt Ground Disturbance Upon Discovery of Subsurface Archaeological Features**	LTSM LTSM
Hazards and Hazardous Materials			
Impact 3.4-1: Potential to Create a Health or Environmental Hazard Through the Use of Vehicle Fuels, Oils, and Lubricants and the Application of Chemicals in IPM Treatments Mechanical treatments proposed under the IPM Program would require the use of equipment and vehicles, which need fuel, oil, and lubricants to operate. Chemical treatments proposed under the IPM Program would involve the use of pesticides (i.e., herbicides, insecticides, rodenticides, and fumigants), which would be applied in targeted locations for invasive plant and pest control. These hazardous materials	LTS	No mitigation is required	LTS

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have the potential to enter the environment and adversely affect human health or sensitive ecosystems through leaks, accidental spills, or improper handling or use. The Authority would comply with laws, regulations, and policies relevant to the use, transport, storage, and disposal of hazardous materials to minimize potential health risks. EPA oversees pesticide use to minimize health and safety risks for workers through the WPS. Additional requirements for pesticide use are enforced by Cal/OSHA, which provides safety standards for workplaces. DPR administers the California Pesticide Regulatory Program, which regulates the sale and use of pesticides in the state. EPMs HAZ-4 through HAZ-6 have also been incorporated into the IPM Program to further minimize the potential for impacts to human health and the environment from pesticide use. These EPMs include requirements to minimize spills, properly dispose of pesticide containers, triple rinse pesticide containers, lawfully store and handle pesticides, and dispose of unused pesticides and pesticide containers to adequately safeguard human, fish, and wildlife health and prevent soil and water contamination. With implementation of existing laws and regulations and the proposed EPMs, the potential to create a health or environmental hazard associated with use, transport, storage, and disposal of pesticides and other hazardous materials under the IPM Program would be less than significant.			
Impact 3.4-2: Potential to Expose the Public or Environment to Significant Hazards from Disturbance to Known Hazardous Materials Sites Ground disturbing manual and mechanical IPM treatments have the potential to expose workers, the public, and the environment to risks associated with existing hazardous materials if present within soils in the treatment areas. Treatment activities would typically occur in undeveloped areas, which are unlikely to contain hazardous materials. However, there is one known active hazardous materials site in the IPM Program Area, the Wright Mine in Rancho Canada del Oro Open Space Preserve. Disturbance of contaminated soils could result in the exposure of the public and environment to health hazards from existing hazardous materials, if present. Therefore, this impact is potentially significant.	PS	Mitigation Measure 3.4-2: Identify and Avoid Known Hazardous Waste Sites Prior to the start of IPM treatment activities requiring soil disturbance in the vicinity of the abandoned Wright Mine, the Authority shall mark/flag the Wright Mine, including a 100-foot buffer around the mine area, and no soil disturbing IPM treatment activities will occur within 100 feet of the site boundaries. If it is determined through coordination with the Central Coast RWQCB, the lead agency responsible for the site, that no potential or known contamination is located on the site, the treatment may proceed as planned.	LTSM

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LTS = Less than significant PS = Potentially significant LTSM = Less than significant with mitigation			
Hydrology and Water Quality			
Impact 3.5-1: Potential to Violate Water Quality Standards or Waste Discharge Requirements, Substantially Degrade Surface or Ground Water Quality, or Conflict with or Obstruct the Implementation of a Water Quality Control Plan Through Manual or Mechanical IPM Treatment Activities The proposed IPM Program includes manual and mechanical treatment activities for invasive plant and wildlife control in the IPM Program Area. Manual treatment activities would generally not result in substantial ground disturbance that could result in adverse effects to water quality. Certain treatments, such as mulching and application of weedmats, would use organic materials and fabrics or plastics. Although mulches are made of organic materials, weedmats could result in an introduction of inorganic materials to water bodies, if in the immediate vicinity. Mechanical IPM treatments, such as mowing/cutting and cultivation, could disturb soils and contribute to runoff into surface waters. In addition, mechanical equipment uses gasoline, diesel fuel, and oils, which have the potential to leak or spill and enter nearby water bodies in runoff. EPMs would be implemented to minimize the potential impacts to water quality, including requiring surveys and for aquatic habitat and prohibiting mechanical equipment use within 15 feet of aquatic resources (EPM BIO-1), and requiring daily equipment checks for leaking equipment when in use and prompt removal if a leak is found (EPM HAZ-1). Recognizing the environmental protections of the EPMs, potential impacts to water quality and associated conflicts with the San Francisco Bay and Central Coast RWQCBs' Basin Plans from manual and mechanical IPM treatment activities would be less than significant.	LTS	No mitigation is required	LTS
Impact 3.5-2: Potential to Violate Water Quality Standards or Waste Discharge Requirements, Substantially Degrade Surface or Ground Water Quality, or Conflict with or Obstruct the Implementation of a Water Quality Control Plan Through Chemical IPM Treatment Activities Chemical IPM treatment activities under the proposed IPM Program would include the use of insecticides, a rodenticide, herbicides, and a fumigant. These chemicals have the potential to contaminate surface or groundwater quality if used in close proximity to surface waters, spilled, or used under the wrong conditions. Because the fumigant and the majority of the insecticides and rodenticides would be used in structures and buildings and delivered through tamper proof bait stations, the	LTS	No mitigation is required	LTS

Impacts	Significance before Mitigation	Mitigation Measures	Significance after Mitigation
LTS = Less than significant PS = Potentially significant LTSM = Less than significant with mitigation			
likelihood of these entering the environment and degrading water quality is low. The proposed IPM Program would address concerns related to the use of herbicides by ensuring that herbicides are applied according to the manufacturer's label directions and consistent with EPMs HAZ-4, HAZ-5, and BIO-1 which protect surface and groundwaters, control drift, and ensure proper storage, handling, and cleanup. Because these protective measures would be implemented into treatment design, risk of substantial degradation to water quality and associated conflicts with San Francisco Bay and Central Coast RWQCBs' Basin Plans from herbicide use would be reduced such that this impact would be less than significant.			
Impact 3.5-3: Potential to Release Substantial Pollutants due to Flooding The IPM Program Area has the potential to be inundated in the areas near creeks in the event of a flood. However, quantities of pollutants would not be substantially increased over existing levels and present in the IPM Program Area because potentially hazardous materials would only be stored in designated locations that are currently used for materials storage; equipment would be inspected daily for leaks to prevent gasoline, diesel fuel, lubricating oils, or grease from entering the environment (EPM HAZ-1); and only pesticides registered for aquatic use would be used within 50 feet of aquatic resources or within 100 feet of aquatic resources when precipitation is forecasted within 24 hours (EPM HAZ-5 and BIO-1). Furthermore, the Santa Clara County General Plan indicates that there is only a one percent chance of a flood occurring each year that would be capable of creating substantial flooding along creeks (Santa Clara County 1994); therefore, the risk of a flood that could inundate the IPM Program Area is low. Lastly, IPM activities would only increase by a few additional treatments over current levels under the IPM Program, which would not result in a substantial increase in the presence of potential pollutants in the IPM Program Area. Therefore, this impact would be less than significant.	LTS	No mitigation is required	LTS
Recreation			
Impact 3.7-1: Potential to Increase the Use of Existing Parks or Other Recreation Facilities Resulting in Physical Deterioration of the Facility The IPM Program proposes to implement various pest control treatment activities on recreational facilities within the IPM Program Area. Mechanical and chemical treatment activities could result in temporary disruptions to recreational uses and access when conducted in public preserves within the IPM Program Area due to	LTS	No mitigation is required	LTS

Impacts	Significance before Mitigation	Mitigation Measures	Significance after Mitigation
LTS = Less than significant PS = Potentially significant LTSM = Less than significant with mitigation			
closures from heavy equipment use or use of herbicides. Recreational users of IPM Program Area preserves may elect to visit alternative regional recreational facilities during closures; however, disruptions to recreational uses would be temporary, lasting between one day and one week, and would typically be confined to one small area of a larger preserve. Therefore, when occurring in an IPM Program Area preserve that is open to the public, other areas of the preserve would likely remain open to recreation. Furthermore, only three of the 14 preserves in the IPM Program Area are open to the public. Because the IPM Program would be implemented across the preserves, the rate at which activities requiring public closures would be minimal. Furthermore, in the long-term, pest control treatment activities would likely benefit public recreation by reducing the presence of nuisance pests, such as poison oak and wasps. The IPM Program would not result in a substantial increase in the use of existing parks or recreation facilities and would not result in the physical deterioration of recreational facilities. Therefore, this impact would be less than significant.			
Wildfire			
Impact 3.8-1: Potential to Substantially Exacerbate Fire Risk and Expose People to Wildfire Pollutants or Uncontrolled Spread of a Wildfire Pest management activities implemented under the IPM Program could result in accidental wildfire ignition risks from the use of vehicles and mechanical equipment in the IPM Program Area, and from the implementation of green flaming to treat vegetation on agricultural lands. However, several EPMs would be implemented to reduce the risk of wildfire ignition from treatment activities by properly maintaining all diesel- and gasoline-powered equipment (EPM HAZ-1), requiring spark arrestors (EPM HAZ-2), and prohibiting smoking in vegetated areas (EPM HAZ-3). Green flaming would be conducted on wet days when fire risk is low, and truck-mounted or backpack water tanks would be on-site during implementation. Furthermore, several fire departments are located in close proximity to the IPM Program Area and would be expected to adequately respond in the event of a wildfire to prevent substantial uncontrolled spread. Implementation of the IPM Program is expected to increase the number of simultaneous IPM treatment activities by a few additional treatments over current levels within the IPM Program Area, which would not be a substantial increase in treatment activities and their associated wildfire ignition risks. Additionally, the IPM	LTS	No mitigation is required	LTS

Impacts	Significance before Mitigation	Mitigation Measures	Significance after Mitigation
LTS = Less than significant PS = Potentially significant LTSM = Less than significant with mitigation			
Program does not include any new housing or other new land uses where the public would congregate; there would be no new occupants that could be exposed to pollutant concentrations from a wildfire or the uncontrolled spread of as wildfire as a result of the IPM Program. In the long-term, the IPM Program is expected to reduce wildfire risk by removing invasive and nuisance vegetation. Therefore, with implementation of EPMs; availability of fire protection services in the IPM Program Area; and anticipated fire risk reduction outcomes of the IPM Program; the IPM Program would not substantially exacerbate fire risk and expose people to the uncontrolled spread of wildfire or wildfire related pollutants. This impact would be less than significant.			
Impact 3.8-2: Potential to Expose People or Structures to Substantial Risks Related to Post-Fire Landslides or Debris Flow As discussed in Impact 3.8-1, the IPM Program would not substantially exacerbate fire risk, and thus would not result in a substantial increase in post-fire flooding and landslide due to an increase in wildfire risk itself. Ground disturbing manual and mechanical IPM activities have the potential to destabilize soils, which could increase the risk of post-fire landslides or debris flow if IPM treatments occur on steep slopes. However, manual and mechanical treatment activities would not typically occur on steep slopes and may be replaced with spraying of herbicides when treatment is deemed necessary, which would not result in ground disturbance and associated slope instability. Ground disturbing mechanical activities such as cultivation and discing would be used to prepare soils for crop production on agricultural lands, which are generally flat and not susceptible to landslides or debris flow. In addition, the IPM Program Area includes undeveloped lands where few buildings and structures are located, and it does not include new housing or any other growth-inducing features. Therefore, it would not place additional people or structures in the IPM Program Area. The IPM Program would not expose people or structures to substantial risks from post-fire landslides or flooding and this impact would be less than significant.	LTS	No mitigation is required	LTS

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1 INTRODUCTION

This ~~Draft~~ Program Environmental Impact Report (PEIR) evaluates the environmental impacts of the proposed Integrated Pest Management (IPM) Program. The Santa Clara Valley Open Space Authority (Authority) is the lead agency for approval of the proposed IPM Program. This version is the Final ~~Draft~~ PEIR, as revised from the Draft PEIR in response to public comment and Authority staff changes. It has been prepared in accordance with the requirements of the California Environmental Quality Act (CEQA) (Public Resources Code [PRC] Section 21000 et seq.) and the State CEQA Guidelines (California Code of Regulations [CCR] Section 15000 et seq). This chapter of the ~~Draft~~ PEIR provides information on the following:

- a summary description of the program requiring environmental analysis;
- type, purpose, and intended uses of the ~~Draft~~ PEIR;
- scope of the ~~Draft~~ PEIR;
- agency roles and responsibilities; and
- standard terminology.

1.1 PROGRAM REQUIRING ENVIRONMENTAL ANALYSIS

The following is a summary of the IPM Program. For further information on the proposed IPM Program, see Chapter 2, "Program Description."

The Authority proposes to implement an IPM Program to comprehensively direct pest management on Authority open space preserves. Most pests are invasive species that are not native to the region and were introduced deliberately or by accident through human activities; thus, the terms "pest" and "invasive" are used interchangeably throughout this document. The IPM Program is intended to formalize guidelines and procedures for the careful management of pests throughout the Authority's preserves, while protecting natural resources and public health. Specific objectives of the proposed IPM Program include the following:

- Develop and implement site-specific pest management strategies that are effective in controlling targeted pests while avoiding damage to natural resources, promoting visitor safety and enjoyment, and protecting human health.
- Keep the interested public informed about treatment strategies, upcoming projects, and environmental and public health protection measures.
- Inhibit the establishment of new invasive species on Authority preserves, such as new invasive plants in natural areas, rangelands, and agricultural properties.
- Maintain an inventory of invasive species infestations, monitor treatment effectiveness, and incorporate relevant monitoring results into future treatment applications.
- Implement an adaptive management framework to promote the long-term effectiveness of pest management activities.
- Develop and implement an IPM Program Guidance Manual (IPM Manual) to standardize pest management and IPM procedures.

To achieve these objectives, the Authority ~~is preparing~~ prepared an IPM Manual to facilitate the design and guide the implementation of pest management strategies that are effective in controlling target pests; cost-effective; safe for human health; and protective of natural resources, including native species, special-status species, and water quality. The IPM Manual was developed based on a review of existing scientific literature and reports documenting best approaches to effective pest management, as well as pest management approaches that have been successfully implemented by the Authority and other local agencies over the past several decades. The overall framework of the IPM Program includes identifying the target species and understanding their life cycle, assessing distribution and abundance of pests, setting thresholds for targeted control, assessing site conditions to identify appropriate treatments using the most benign suite of control methods to target the most vulnerable stage in a pest's life cycle, and preventing pest problems through early detection and rapid response programs.

1.2 PURPOSE AND INTENDED USES OF THIS ~~DRAFT~~ PEIR

According to CEQA, preparation of an environmental impact report (EIR) is required whenever it can be fairly argued, based on substantial evidence, that a proposed project may result in a significant environmental impact. An EIR is an informational document used to inform public-agency decision makers and the general public about the significant and potentially significant environmental impacts of a project, identify feasible ways to minimize the significant impacts, and describe a reasonable range of alternatives to the project that could feasibly attain most of the basic objectives of the project while substantially lessening or avoiding any of the significant environmental impacts. Public agencies are required to consider the information presented in the EIR when determining whether to approve a project.

This ~~Draft~~ PEIR has been prepared to meet the requirements of a Program EIR as defined by State CEQA Guidelines Section 15168(c) for streamlining later activities. According to Section 15168 of the State CEQA Guidelines, a Program EIR may be prepared on a series of actions that can be characterized as one large project and are related to, among other things, the issuance of general criteria to govern the conduct of a continuing program or individual activities carried out under the same authorizing statutory or regulatory authority, and having generally similar environmental effects that can be mitigated in similar ways.

The Authority must evaluate the later activities associated with the IPM Program to determine whether such activities have been covered in this PEIR. Such evaluations must ascertain whether these future pest management activities are consistent with the activities contained in the IPM Program and would have effects that were examined in the PEIR. If the Authority finds that the impacts were covered in the ~~Draft~~ PEIR and no new or substantially more severe significant effects could occur and substantially different mitigation measures would be required for a later pest management activity, the activity can be found to be within the scope of this PEIR. In this circumstance, no additional CEQA documentation would need to be prepared or publicly circulated (State CEQA Guidelines Section 15168[c][2] and [4]). A checklist or similar documentation would be used to substantiate the "within-the-scope" finding would provide the substantial evidence required to reach that conclusion. For the IPM Program, this documentation would be completion of a Within-the-Scope Checklist. The Authority may act on the proposed later pest management activity using this documentation and the ~~Draft~~ PEIR for CEQA compliance purposes. If the later pest management activity is found to be within the scope of this PEIR and the project is approved, the Authority would file a Notice of Determination.

1.3 SCOPE OF THIS ~~DRAFT~~ PEIR

Under the CEQA statute and the State CEQA Guidelines, a lead agency may limit an EIR's discussion of environmental effects when such effects are not potentially significant (PRC Section 21002.1[e]; State CEQA Guidelines Sections 15128, 15143). Information used to determine which impacts would be potentially significant was derived from review of the IPM Program; review of applicable planning documents and CEQA documentation; review of similar pest management programs; comments received during a public scoping meeting held on October 29, 2019; and comments received on the Notice of Preparation (NOP) (see Appendix A of this ~~Draft~~ PEIR).

The NOP was distributed on October 17, 2019 to responsible and trustee agencies, interested parties, and organizations, as well as private organizations and individuals that may have an interest in the IPM Program. The purpose of the NOP and the scoping meeting was to provide notification that a PEIR for the IPM Program was being prepared and to solicit input on the scope and content of the environmental document. Further information on the NOP and scoping process is provided below in Section 1.5, "Public Review Process." As a result of the review of existing information and the scoping process, it was determined that the following environmental topics listed below should be evaluated fully in this ~~Draft~~ PEIR, as well as other CEQA-mandated issues (e.g., cumulative impacts, growth-inducing impacts, significant unavoidable impacts, alternatives):

- aesthetics,
- cultural and tribal cultural resources,
- biological resources,
- hazards and hazardous materials,
- hydrology and water quality,
- recreation, and
- wildfire.

1.4 AGENCY ROLES AND RESPONSIBILITIES

1.4.1 Lead Agency

The Authority is the lead agency responsible for approving and carrying out the IPM Program and for implementing the requirements of CEQA. Before deciding whether to approve or deny the proposed IPM Program, the Authority (as lead agency) is required to certify that the PEIR has been completed in compliance with CEQA, that the decision makers reviewed and considered the information in the PEIR, and that the PEIR reflects the independent judgment of the lead agency ~~After the Draft PEIR public-review process is complete, the Authority will determine whether to certify the PEIR (see State CEQA Guidelines Sections 15090) and approve the IPM Program~~.

1.4.2 Trustee and Responsible Agencies

A trustee agency is a State agency that has jurisdiction by law over natural resources that are held in trust for the people of the State of California. The only trustee agency that has jurisdiction over resources potentially affected by the project is the California Department of Fish and Wildlife.

Responsible agencies are public agencies, other than the lead agency, that have discretionary-approval responsibility for reviewing, carrying out, or approving elements of a project. Responsible agencies should participate in the lead agency's CEQA process, review the lead agency's CEQA document, and use the document when making a decision on project elements. It is anticipated that responsible agencies could include the U.S. Army Corps of Engineers, U.S. Fish and Wildlife Service, Santa Clara Valley Habitat Agency, Santa Clara County Agricultural Commissioner, and the San Francisco Bay and Central Coast Regional Water Quality Control Boards. Potential permits and approvals required are disclosed in Table 2-4 of the ~~Draft~~ PEIR.

1.5 PUBLIC REVIEW PROCESS

As identified above in Section 1.3, "Scope of this ~~Draft~~ PEIR," in accordance with CEQA regulations, a NOP was distributed on October 17, 2019. The NOP was available at the Authority office, located at 33 Las Colinas Lane in the City of San Jose, and online at www.openspaceauthority.org/IPM. The NOP, responses to the NOP, and input received at the public scoping meeting are included in Appendix A of this ~~Draft~~ PEIR.

Th~~is~~e Draft PEIR ~~is being~~ was circulated for public review and comment for a period of 45 days. The public review and comment period ~~begins~~ began on March 31, 2021 and close~~s~~d on May 17, 2021. During this period, comments from the general public as well as organizations and agencies on environmental issues ~~may~~ could be submitted to the Authority. Comments c~~an~~ould be mailed to Galli Basson, Resource Management Specialist, at 33 Las Colinas Lane, San Jose, CA 95119 or emailed to gbasson@openspaceauthority.org. All comments ~~must~~ needed to be received by 5:00 p.m. on May 17, 2021.

A public meeting ~~will be~~ was held on the Draft PEIR on April 20, 2021, at 6:00 p.m. online via live stream due to the COVID-19 pandemic and restrictions placed on in-person gatherings. Oral and written comments ~~will be~~ were received at the public meeting. Upon completion of the public review and comment period, ~~a~~ this Final PEIR ~~will be~~ was prepared that ~~will~~ includes ~~both written and oral~~ the comments on the Draft PEIR received during the public-review period, responses to those comments, and any revisions to the Draft PEIR made in response to public comments. ~~The Draft PEIR and Final PEIR will comprise the PEIR for the IPM Program.~~

Before adopting the IPM Program, the lead agency is required to certify that the PEIR has been completed in compliance with CEQA, that the decision-making body reviewed and considered the information in the PEIR, and that the PEIR reflects the independent judgment of the lead agency.

1.6 ~~DRAFT~~ PEIR ORGANIZATION

This ~~Draft~~ PEIR is organized into chapters, as identified and briefly described below. Chapters are further divided into sections (e.g., Chapter 3, "Environmental Impacts and Mitigation Measures" and Section 3.3, "Biological Resources"):

The "Executive Summary": This chapter introduces the IPM Program; provides a summary of the environmental review process, effects found not to be significant, and key environmental issues; evaluates growth-inducing impacts and irreversible and irretrievable commitment of resources; lists significant impacts and mitigation measures to reduce significant impacts to less-than-significant levels; and discloses any significant and unavoidable adverse impacts.

Chapter 1, "Introduction": This chapter provides a description of the lead, trustee, and responsible agencies, the legal authority and purpose for the document, and the public review process.

Chapter 2, "Program Description": This chapter describes the location, background, and goals and objectives for the IPM Program. It also describes the various pest management and treatment methods in detail. The anticipated permits and approvals that are anticipated to implement the IPM Program are summarized. Lastly, the chapter lists the environmental protection measures that would be incorporated into the design of treatments under the IPM Program as part of the program description to avoid or minimize environmental impacts and help achieve compliance with applicable laws and regulations.

Chapter 3, "Environmental Impacts and Mitigation Measures": The sections within this chapter evaluate the expected environmental impacts generated by the IPM Program, arranged by subject area (e.g., aesthetics, hazards and hazardous materials). Within each subsection of Chapter 3, the regulatory background, existing conditions, analysis methodology, and thresholds of significance are described. The anticipated changes to the existing conditions after implementation of the IPM Program are then evaluated for each subject area. For any significant or potentially significant impact that would result from IPM Program implementation, mitigation measures are presented and the level of impact significance after mitigation is identified. Environmental impacts are numbered sequentially within each section (e.g., Impact 3.2-1, Impact 3.2-2, etc.). Any required mitigation measures are numbered to correspond to the impact numbering. Accordingly, the mitigation measure for Impact 3.2-2 would be Mitigation Measure 3.2-2.

Chapter 4, "Cumulative Impacts": This chapter evaluates potential impacts that would result from implementation of the IPM Program together with other past, present, and probable future projects.

Chapter 5, "Alternatives": This chapter evaluates alternatives to the IPM Program, including alternatives considered but eliminated from further consideration, the No Program Alternative, and two other alternatives. The environmentally superior alternative is identified.

Chapter 6, "Report Preparers": This chapter identifies the preparers of this document.

Chapter 7, "References": This chapter identifies the organizations and persons consulted during preparation of this ~~Draft~~ PEIR and the documents and individuals used as sources for the analysis.

1.7 STANDARD TERMINOLOGY

This ~~Draft~~ PEIR uses the following standard terminology:

"No impact" means no change from existing conditions (no mitigation is needed).

"Potentially significant impact" means an impact that might cause a substantial adverse change in the environment (mitigation is recommended because potentially significant impacts are treated as significant).

"Significant impact" means an impact that would cause a substantial adverse change in the physical environment (mitigation is recommended).

"Significant and unavoidable impact" means an impact that would cause a substantial adverse change in the physical environment and that cannot be avoided, even with the implementation of all feasible mitigation.

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2 PROGRAM DESCRIPTION

The Santa Clara Valley Open Space Authority (Authority) proposes to implement an Integrated Pest Management Program (IPM Program) to comprehensively direct pest management on Authority-owned open space lands. The IPM Program is intended to describe comprehensive guidelines and procedures for the careful pest management throughout the Authority's preserves while protecting natural resources and public health. The Authority has prepared an IPM Program Guidance Manual (IPM Manual, Appendix B), which would be used to implement pest management actions adopted in the IPM Program. The IPM Manual presents an objective evaluation tool and process for the Authority to effectively and efficiently make IPM Program decisions while providing for safe recreational use of the preserves and protecting natural and cultural resources.

The proposed IPM Program, as described by the IPM Manual, is the subject of this Program Environmental Impact Report (PEIR), which is prepared pursuant to the California Environmental Quality Act (CEQA) and State CEQA Guidelines.

2.1 INTEGRATED PEST MANAGEMENT PROGRAM OVERVIEW

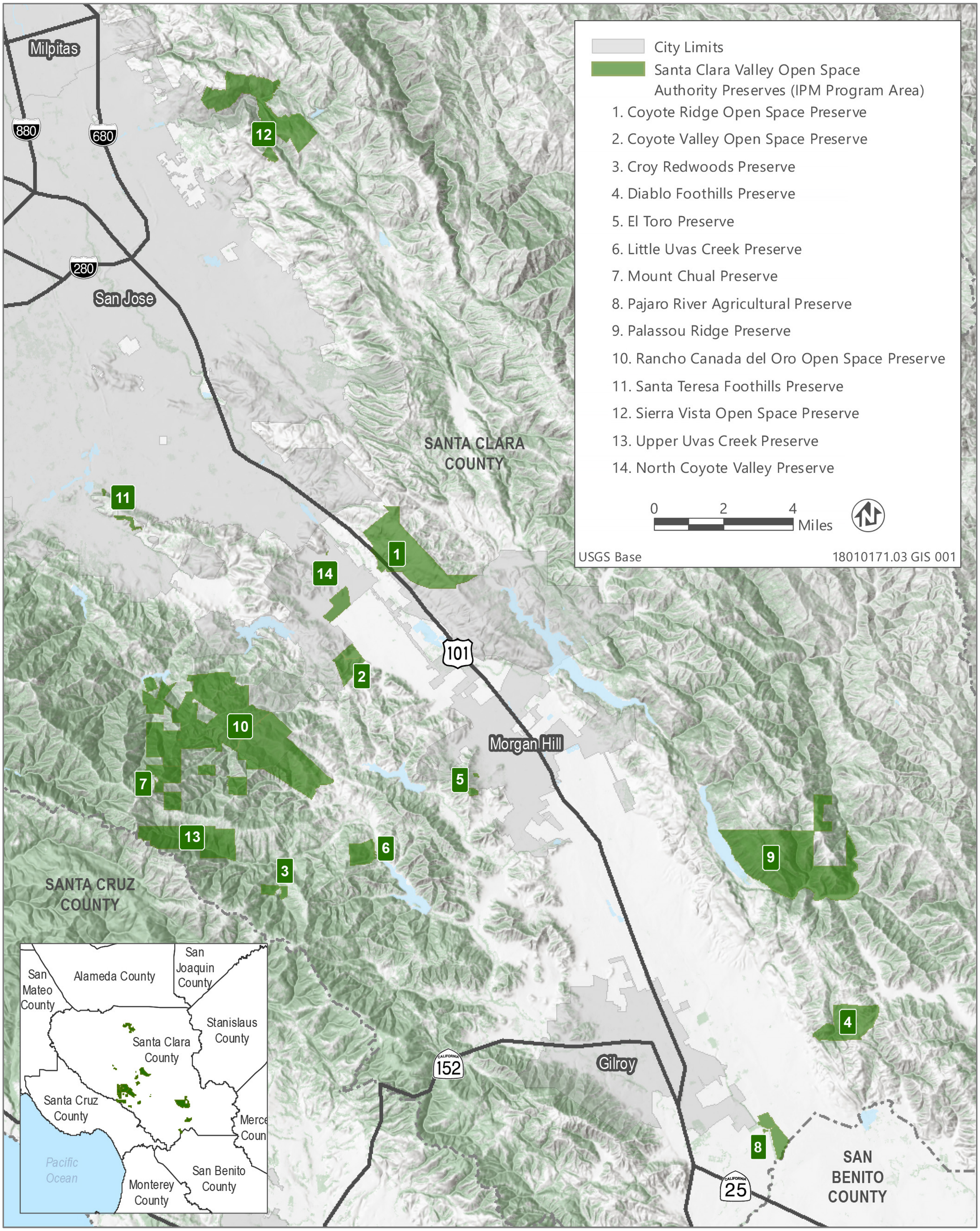
The IPM Manual was developed to facilitate the design and implementation of pest management strategies that are effective in controlling the target pests, cost-effective, safe for human health, and protective of natural resources including native species, special-status species, and water quality. The IPM Manual is designed to inform the decision-making process in the management of the Authority's open space preserves.

Most pests are invasive species that are not native to the region and were introduced deliberately or by accident through human activities. As described in greater detail in Sections 3 through 7 of the IPM Manual (Appendix B), invasive plants, animals, and pathogens can negatively impact native species through a variety of mechanisms, alter natural ecosystem processes, create fire hazards, and degrade recreational opportunities within the Authority's lands. Though native plants and animals are critical components of the natural ecosystems that the Authority protects, certain species can have negative impacts on natural lands and are also considered pests. Accordingly, the terms "pest" and "invasive" are used interchangeably throughout this document. Examples of native plant and animal species that are regarded as pests by the Authority include rodents that colonize buildings, stinging insects that establish around picnic areas, and plants with spines or oils (e.g., poison oak) that can cause allergic reactions along trail corridors.

The IPM Program Area includes the 14 open space preserves owned and managed by the Authority and excludes privately-owned land over which the Authority holds conservation easements or that the Authority manages on behalf of other agencies or non-profits. Refer to Figure 2-1 for an overview of the regional vicinity of the IPM Program Area and for an overview of the preserves included in the IPM Program Area.

The IPM Manual was developed based on review of existing scientific literature and plans documenting best approaches to effective pest management, as well as pest management approaches that have been successfully implemented by the Authority over the past several decades. There are six main components of the IPM Program:

1. Identifying a target species and understanding its life cycle and ecology;
2. monitoring and assessing the pest's distribution and abundance to gauge its impacts;
3. setting thresholds for targeted control to limit the pest's impacts while avoiding unnecessary and potentially costly treatments;
4. assessing site conditions to identify appropriate control treatments;
5. using the most benign, effective suite of control methods, by targeting the most vulnerable stage in a pest's life cycle and using biological, cultural, physical/mechanical, and chemical management tools; and
6. preventing pest problems through implementation of best management practices, early detection, and rapid response programs, among other prevention approaches.



Source: Data received from the Authority in 2019 and 2021

Figure 2-1 IPM Program Area

The factors used to design specific prescriptions and the resulting treatments vary depending on the type of targeted pest and the environment in which it occurs. Given the varied landscapes in which pests could occur, and that pest management techniques are rapidly evolving through scientific research and technical innovations, the IPM Manual outlines approaches for different IPM management categories, which include natural lands, agricultural lands, recreational facilities, and buildings and structures.

A variety of methods can be used to manage pest plants and animals. The IPM Program evaluated herein includes manual, mechanical, and chemical control methods, which are described in greater detail in Section 2.7.1, "IPM Treatment Types." The IPM Manual also includes cultural control techniques as another pest management approach, such as grazing and prescribed burning. The Authority previously developed separate grazing policies and completed specific grazing plans and associated evaluations for its preserves; therefore, grazing is not described in detail in the IPM Manual and is not evaluated in this PEIR. Fuel management techniques, such as prescribed burning, will be described and evaluated in future separate Authority long-range planning and environmental compliance documents specific to fire fuel management. Therefore, fuel management techniques are also not evaluated in this PEIR.

The costs and benefits of each treatment approach often depend on the specific circumstances of the pest infestation, including the ecology and impacts of the pest species, its population size and distribution, and its location with respect to other conservation values (e.g., special-status species) and human facilities and activities (e.g., public access facilities and trails). As a result, it is not feasible to prescribe one treatment for each type of pest; instead, the IPM Manual outlines an approach to determining the appropriate treatment based on the relevant factors that influence its effectiveness, efficiency, and risks. Importantly, the IPM Program approach incorporates an adaptive framework designed to achieve the Authority's land management goals over time by providing opportunities to integrate newly developed scientific techniques and the lessons learned from monitoring treatments over time.

As part of implementation, the Authority would develop a priority system to rank pest control projects, develop an early detection and rapid response program, and conduct regional pest management research and monitoring to stay apprised of recent innovations in pest control science, pest control methods, and pests that are detected near Authority preserves but may not yet be problematic. An annual IPM Work Plan would be developed to describe, prioritize, and direct the upcoming year's activity, before initiating treatments. Pest management activities would be reviewed and approved, and priorities would be set through the development and approval of the annual IPM Work Plan. Any new pest management activities not included in the annual IPM Work Plan would be reviewed on an individual basis throughout the year. In addition, an annual IPM Program Report would be developed at the end of each year. It would summarize the IPM Program work completed in the previous year, evaluate the IPM Program's progress in meeting overall goals by monitoring the effectiveness of treatments, and would include any recommended modifications to the IPM Program to be included the following year, which would facilitate adaptive management of the program.

2.2 PROCESS FOR CHANGES TO THE IPM PROGRAM

As described above, the IPM Program would employ adaptive management that responds to annual pest conditions on Authority Preserves, as well as research-based changes in IPM techniques and equipment. Each year Authority staff would select IPM treatment project sites for implementation, through preparation of an Annual IPM Work Plan, based on current conditions. In some cases, new pests may require treatment or new treatment methods may be discovered. Each year Authority staff would determine the IPM activities that need to be implemented and review those activities against those included in the IPM Manual and evaluated in this PEIR. In certain instances, the Authority would determine if new activities are not evaluated under this PEIR and the IPM Manual. Examples include new IPM activities that are substantially different from the activities described herein; new preserves are acquired by the Authority that require substantially different IPM treatment activities (e.g., because of differences in the sensitive resources or pests that are present), or new chemicals with different active ingredients from those described herein are proposed for use. The Authority may be required to amend the IPM Manual and prepare appropriate subsequent or supplemental environmental documents.

Regarding chemical treatments, the list of approved pesticides (refer to Table 2-3) is intended to change over time as the science of pest control advances and more effective, safer, and less harmful pesticides are developed; as manufacturers update, discontinue, or substitute products; and as the Authority's target pests change over time. The process for updating the list of approved pesticides is described in detail in the IPM Manual (Appendix B) and summarized below.

- Product Eliminations: In instances where products on the list are no longer available from the manufacturer, are found to be ineffective against the Authority's target pests, or if new risks are discovered that were not previously known or evaluated by the Authority (see Appendix HAZ-1), a product may be eliminated from the List of Approved Pesticides. This type of change would require an update to the list of approved pesticides but would not require additional environmental review.
- Product Substitutions: When manufacturers substitute a product or change a product name or formulation, but the active ingredient stays the same, the new product can be substituted for the old product on the list of approved pesticides. In general, this type of change to the list would not trigger a change in condition or result in the need for additional environmental documentation. However, this change would require an update to the Authority's list of approved pesticides. The substitution would be reviewed in light of the analysis in the PEIR, however, revisions to the PEIR would only be required if the substitution results in a substantive change in human health exposure, environmental fate, or toxicity. Public circulation of an EIR supplement or revised EIR would only be required if the substitution led to a new significant environmental impact or a substantial increase in an identified significant environmental impact.
- Product Additions: In instances where new products with new active ingredients not evaluated in this PEIR are found to be safer, more effective, and/or less costly than the chemicals evaluated herein, the Authority may elect to add new pesticides. This type of change would require additional toxicological review, and depending on the results, may also require additional environmental documentation. The addition would be reviewed in light of the analysis in the PEIR, however, revisions to the PEIR would only be required if the added compound results in a substantive change in human health exposure, environmental fate, or toxicity. Public circulation of an EIR supplement or revised EIR would only be required if use of the additional compound led to a new significant environmental impact or a substantial increase in an identified significant environmental impact.

Based on the process described above, Authority staff would determine whether any chemical product substitutions or additions would be required and would consult with appropriate technical experts and Pest Control Advisors (PCAs) to determine whether any change would occur with respect to human health exposure, environmental fate, or toxicity compared to that evaluated in this PEIR. If it is determined that the potential effects related to the new chemical are covered by this PEIR, the Authority would note this for its records, update the IPM Manual, and no further analysis would be required. If it is determined that proposed additions or substitutions are not covered in this PEIR, then the Authority would complete the appropriate additional environmental documentation and seek discretionary consideration before use of the chemicals. This process of evaluation and potential later environmental documentation would be the same for other IPM Program changes, such as the incorporation of new preserves or development of new pest control techniques.

2.3 GEOGRAPHIC EXTENT OF THE PROGRAM

The Authority has preserved over 25,000 acres of open space, natural areas, watersheds, and wildlife habitat in the cities of Campbell, Milpitas, Morgan Hill, San Jose, and Santa Clara and the unincorporated areas of Santa Clara County. Some of these lands are Authority-owned and -managed preserves. On other privately-owned lands, the Authority holds easements, but the lands are managed by private property owners, other agencies, or non-profit organizations.

The IPM Program Area includes the 14 open space preserves currently owned and managed by the Authority, totaling 16,446 acres (refer to Figure 2-1). Of the Authority preserves, three are currently open to the public. The preserves included in the IPM Program are described in Table 2-1 below. The IPM Program would also be applied to new open space land acquired by the Authority to add or expand preserves in the future. As described above in Section 2.2, “Process for Changes to the IPM Program,” the Authority would evaluate the conditions of newly acquired preserves to determine if the potential effects that could occur are examined in this PEIR. If it is determined that the potential effects associated with the newly acquired preserve are covered by this PEIR, the Authority would note this for its records, update the IPM Manual, and no further analysis would be required. If it is determined that environmental effects specific to the additional preserve land are not covered in this PEIR, then the Authority would complete the appropriate additional environmental documentation and seek discretionary consideration before applying IPM techniques.

Table 2-1 Authority-Owned and Managed Preserves Included in the IPM Program Area

Preserve # from Figure 2-1	Preserve Name	Acres	Public Access Status
1	Coyote Ridge	1,832	Closed
2	Coyote Valley	348	Open
3	Croy Redwoods	116	Closed
4	Diablo Foothills	834	Closed
5	El Toro Preserve	39	Closed
6	Mount Chual	552	Closed
7	Pajaro River Agricultural Preserve	284	Closed
8	Palassou Ridge	3,524	Closed
9	Rancho Canada del Oro	5,538	Open
10	Santa Teresa Foothills	62	Closed
11	Sierra Vista	1,590	Open
12	Upper Uvas	1,216	Closed
13	Little Uvas	276	Closed
14	North Coyote Valley	235	Closed

Note: Acreages are rounded to the nearest one.

Source: Data compiled by Authority and Ascent Environmental in 2019 and 2021

2.4 POLICY AND PLANNING CONTEXT FOR THE IPM PROGRAM

The Authority’s IPM Policy guides Authority staff in preventing and managing pests in its open space preserves. It was developed with input from the Citizen’s Advisory Committee and partner agencies and organizations. The policy does not apply to privately-owned land over which the Authority holds conservation easements. The IPM Program would be consistent with the IPM Policy, which is as follows:

- IPM Policy 1: Develop pest management strategies and priorities to:
  - Manage invasive species in natural areas and set priorities for their control to maximize the benefits for sensitive native communities and species and loss of biodiversity.
  - Manage pests on agricultural properties to support existing uses, while also protecting human health and surrounding natural resources.
  - Manage pests and potential human interactions in recreational facilities to minimize conflict, ensure visitor safety and enjoyment, and protect the surrounding natural resources.
  - Manage pests in buildings to support existing uses, while also protecting human health and surrounding natural resources.

- **IPM Policy 2**: Take appropriate actions to prevent the establishment of new invasive species to Authority lands, especially new invasive plants in natural areas, rangelands, and agricultural properties.
  - Develop and implement best management practices to reduce the risk of invasion of exotic species into open space preserves, as part of steps to manage facilities, recreation, and vegetation, including through conservation grazing.
  - Implement an early detection rapid response program, which includes routinely inspecting areas that are most susceptible to invasion.
  - Focus on preservation of habitat with intact native vegetation and target populations of invasive species before they are widespread.
  - Stay abreast of regional invasive plant species issues and their management by coordinating with partners and neighboring landowners.
  - Promote visitor and staff education to prevent the spread of invasive species.
- **IPM Policy 3**: Manage and monitor invasive species through an adaptive management framework that includes the following measures designed to promote long-term effectiveness, including:
  - Develop and maintain an inventory of invasive species on Authority lands.
  - Prioritize treatment of invasive species based on the benefits of treatment for sensitive species, as well as the risk posed by failure to control them, the ability of treatment to enhance other conservation values, including working lands, scenic values, and cultural resources, and their feasibility.
  - Prescribe site-specific strategies for control that provide the best combination of protecting Authority resources, human health, and non-target organisms that are efficient and cost effective in controlling the target species, and that reflect the species' biology and life-cycle.
  - Use the most appropriate method(s) to control invasive species including by integrating multiple management techniques such as grazing, manual removal, and mowing. Where pesticides are necessary, apply according to the label using all safety precautions and take all measures needed to protect the environment, health, and safety of visitors, employees, neighbors, and the surrounding natural areas including water and soil resources.
  - Monitor treatment effectiveness and adapt control techniques based on results as well as the latest research on invasive species ecology and management, and new methods and tools.
  - Plan for repeat treatments as needed based on species regenerative capabilities.
  - Coordinate and cooperate with adjacent landowners, neighbors, and other responsible agencies to control species regionally, wherever feasible.
  - Use prevention techniques such as early detection rapid response, training, use of volunteers, and BMPs.
- **IPM Policy 4**: Develop and implement a Guidance Manual to standardize pest management and IPM procedures.
  - Evaluate the general types of pests and also individual species that will be subject to management, based on an assessment of their impacts on the ability of the Authority to achieve its mission;
  - Develop goals for management of types of pests, and criteria for assigning species or suites of species to the goals based on the costs and benefits of control;
  - Identify a suite of alternative management techniques that are cost-effective and safe;
  - Develop a framework for prioritizing management, given that resources are inherently limited; and
  - Identify best management practices to be implemented during pest management, to limit impacts to non-target species, other natural resources, and human health and safety, and facilitate environmental review of the IPM program (i.e., under CEQA).

2.5 OBJECTIVES OF THE IPM PROGRAM

The State CEQA Guidelines call for the identification of objectives sought by a proposed project (CEQA Guidelines Section 15124[b]). A statement of objectives helps convey the reasons for considering approval of the proposed IPM Program, including its intended benefits, and guides the development of a reasonable range of alternatives to evaluate in the PEIR.

The overall goal of the IPM Program is to effectively manage pests in the Authority's open space preserves and facilities, while protecting human health and environmental quality. Specific objectives of the proposed IPM Program include the following:

- develop and implement site-specific pest management strategies that are effective in controlling targeted pests while avoiding damage to natural resources, promoting visitor safety and enjoyment, and protecting human health;
- keep the interested public informed about treatment strategies, upcoming projects, and environmental and public health protection measures;
- inhibit the establishment of new invasive species on Authority preserves, such as new invasive plants in natural areas, rangelands, and agricultural properties;
- maintain an inventory of invasive species infestations, monitor treatment effectiveness, and incorporate relevant monitoring results into future treatment applications;
- implement an adaptive management framework to promote the long-term effectiveness of pest management activities; and
- develop and implement an IPM Manual to standardize pest management and IPM procedures.

2.6 EXISTING AUTHORITY IPM ACTIVITIES

The Authority conducts IPM activities under existing conditions with less frequency and geographic coverage than is proposed under the IPM Program. Currently, the Authority implements manual, mechanical, and chemical treatments for vegetation and animal pest management near roads and trails, recreational facilities, structures, and sensitive habitats across Authority preserves. Vegetation management consists of mowing approximately 60 acres per year, including along roads and trails primarily with weed whips, hedgers, chainsaws, pole saws, chippers, tractor-operated mowers, small rider mower, and walk behind flail. Areas of high use are brushed more frequently. Trails are weed whipped twice per year (spring/summer), and roads are mowed once per year (late summer). If the region experiences a year with unusually high precipitation, this is done one more time (i.e., weed whip trails three times and mow roads twice). Additional vegetation treatments are generally done by hand pulling or cutting, digging, ploughing, discing, mulching, or hoeing. Pest management consists of snap traps for rodents, sticky boxes for insects, wasp nest removal, and shooting/harassment of wild pigs.

Chemical spraying of herbicides is conducted across approximately 40 acres each year; application is by hand with a backpack sprayer, or by all-terrain vehicle (ATV) or truck with a downward facing boom. The Authority owns 10 backpack sprayers, two truck mounted sprayers, four ATV sprayers, and one rope wick (a long handheld tube with a rope at the end used to wipe herbicides onto target species). Herbicides that are currently being used by the Authority consist of Glyphosate (Roundup Pro), Capstone, Envoy, Milestone, Telar, Transline, Vista, and WeedZap. The Authority also uses insecticides as a last resort to treat problem insect or rodent infestations The Authority follows all herbicide label directions and adheres to all federal, state, and local laws and regulations controlling pesticide use.

Typically, up to 20 treatment activities are conducted simultaneously across the Authority's preserves, and each activity requires one to three Authority staff members to implement. Equipment and materials needed for IPM activities (e.g., mowers, fuels, herbicides) are stored at the Authority's administrative office in the city of San Jose, as well as two field offices within the IPM Program Area. One field office consists of a two barn structures located within the southeastern corner of the Rancho Canada del Oro Preserve, and the other is a barn structure located within the Sierra Vista Preserve.

2.7 PROPOSED IPM PROGRAM TREATMENT ACTIVITIES

The IPM Program would expand upon the types, frequency, and geographic extent of existing IPM activities conducted by the Authority and includes additional treatment types and methods. The Authority would also implement increased early detection and rapid response, mapping, and post treatment monitoring.

The IPM Manual outlines IPM management categories to help determine the appropriate treatment types and methods for a particular landscape and situation. The IPM management categories consist of: 1) structures and buildings, 2) recreational facilities, 3) agricultural lands, and 4) natural lands. The treatment types include a variety of manual, mechanical, and chemical treatments with varying types of application methods. The Authority anticipates that with implementation of the IPM Program, one to two additional staff may be hired, and the number of annual treatment activities occurring simultaneously could increase by approximately 20 percent (i.e., up to four additional IPM treatment activities would occur). Generally, individual IPM treatment activities (or treatment projects) would occur over one day to one week.

The IPM Program outlines various treatment types and associated methods for each of the management categories. The treatment types, methods of application, and underlying purposes are summarized in Table 2-2 below. It is important to note that the Authority would implement the treatments in an integrated manner, so while a specific treatment type is identified for a management category in Table 2-2, other treatment types identified for a treatment site may be implemented on a year-to-year basis according to the site conditions observed.

The IPM treatment options are tailored to each of the Authority's IPM management categories because each category represents not only a different purpose, but also a different type of environment. In general, the first two management categories (i.e., buildings/structures and recreational facilities) represent conditions that have been altered to a greater degree by development or for visitor use, so they are more frequently occupied or visited by visitors and/or staff, and are where the Authority has greater concerns for human safety. The last two categories (i.e., agricultural lands and natural lands) would be applied in the landscape, either altered by agricultural practices or occupied by natural habitat.

2.7.1 IPM Treatment Types

For each IPM management category under the IPM Program, the treatment type (e.g., manual, mechanical, chemical control) and treatment timing would be site-specific and based on various factors (i.e., infestation size and density, the life cycle of the pest, the type and sensitivity of the site to be treated, the potential for the presence of special-status species habitat to occur in proximity to the treatment site, access restrictions, weather, and the availability of labor). A general description of the treatment types covered under the IPM Program and typical conditions for implementing the treatment are described below as well as in the IPM Manual (Appendix B).

Table 2-2 IPM Program Treatment Activities and Methods

IPM Management Category	Treatment Type	Treatment Method	Method of Application	Purpose
Structures and Buildings	Manual	Prevention, sanitation	— — —	Structural pests, stray wildlife and pets
		Habitat modification, physical barriers/exclusion	Remove brush piles, fill/cover entry points, ~~destroy~~ remove old rodent burrows using tractor and ripping bar, install curtain wall of concrete	Structural pests, stray wildlife and pets
		Trapping	sticky, electric, snap or box traps, live box or cage traps	Structural pests, stray wildlife and pets
	Chemical	Insecticidal Soap Spray	Targeted spray	Structural pests
		Diatomaceous earth	Dusting	Structural pests
		Boric Acid	Bait container, dusting	Structural pests
		Hydroprene	Targeted spray, bait container, foam	Structural pests
		Indoxacarb	Bait container	Structural pests
		Fipronil	Bait container	Structural pests
		Cholecalciferol	Tamper-proof bait container	Vertebrate pests
		Sulphuryl fluoride	Tenting and fumigating structures	Structural pests
Recreational Facilities	Manual	Digging/clearing	Pickaxe, hoe, other hand tools	Fire risk reduction near utilities
		Prevention, sanitation	— — —	Stinging insects, mosquitos, ticks, rattlesnakes
		Habitat modification, physical barriers/exclusion	Remove rock and brush piles, fill/cover entry points, nest removal (water jets/digging)	Stinging insects, mosquitos, rattlesnakes, stray wildlife and pets
		Trapping	water/lure, carbon dioxide, tongs/funnel, live box or cage traps	Stinging insects, ticks, stray wildlife and pets
	Mechanical	Mowing/cutting	Weed whips, hedgers, chainsaws, pole saws, chippers, tractor operated mowers	Roads, trails, parking lots, gates, fences, stiles, special events
		Cutting/limbing	Chainsaws, chippers	Hazard and downed tree removal
	Chemical	Pyrethrin	Targeted spray	Stinging insects
		Glyphosate (Roundup ProMax)	Spray application (backpack or boom on ATV)	Problem vegetation near roads, trails, parking lots, utilities
		Imazpyr	Spray application (backpack or boom on ATV)	Problem vegetation near roads, trails, parking lots, utilities
Agricultural Lands	Manual	Pulling, mulching, hoeing, weedmats	Hoe and other hand tools	Invasive plants
		Prevention, trapping, habitat modification	Live box or cage traps, remove old rodent burrows using tractor and ripping bar	Invasive plant and animal control

IPM Management Category	Treatment Type	Treatment Method	Method of Application	Purpose
	Mechanical	Mowing/cutting, cultivation, green flaming, discing	Mowers, tillers, tractors, brushcutters, brushrakes, flame equipment	Invasive plants
Natural Lands	Manual	Digging, hand pulling, scraping, mulching	Weed wrenches, shovel, hoe, hand saw, clippers, other hand tools	Invasive plant control
		Tarping/solarizing	— — —	Invasive plant control
		Prevention	— — —	Invasive plant and animal control
		Habitat modifications, physical barriers/exclusion	— — —	Invasive animal control
		Biocontrol insects	— — —	Invasive plant control
		Trapping, gigging, shooting, electrical currents	— — —	Invasive animal control
	Mechanical	Cutting/mowing/weed whipping	Mowers, brushcutters, weed whacker	Invasive plant control
		Girdling/drilling	Chainsaws, drills	Invasive plant control
		Flaming	Propane burner	Invasive plant control
	Chemical	Glyphosate (Round-Up Pro)	Cut-stump, spray (backpack or boom on ATV), wicking	Invasive plant control
		Capstone	Cut-stump, spray (backpack or boom on ATV), wicking	Invasive plant control
		Envoy	Cut-stump, spray (backpack or boom on ATV), wicking	Invasive plant control
		Milestone	Cut-stump, spray (backpack or boom on ATV), wicking	Invasive plant control
		Telar	Cut-stump, spray (backpack or boom on ATV), wicking	Invasive plant control
		Transline	Cut-stump, spray (backpack or boom on ATV), wicking	Invasive plant control
		Vista XRT	Cut-stump, spray (backpack or boom on ATV), wicking	Invasive plant control
		Weed Zap	Cut-stump, spray (backpack or boom on ATV), wicking	Invasive plant control
		Dimension	Cut-stump, spray (backpack or boom on ATV), wicking	Invasive plant control
		Gallery	Cut-stump, spray (backpack or boom on ATV), wicking	Invasive plant control
		2-D4	Cut-stump, spray (backpack or boom on ATV), wicking	Invasive plant control
		Scythe	Spray (backpack or boom on ATV)	Invasive plant control

Source: Adapted from Appendix B

MANUAL TREATMENTS

Manual control treatments consist of prevention, sanitation, habitat modification, pulling, digging, hoeing, physical barriers/exclusion, covering/tarping, crop rotation, soil sterilization, mulching, weedmats, release of biocontrol insects, trapping, gigging, shooting, and electrical currents. Some of these actions have limited physical environmental disturbances compared to the more active pulling, digging, and use of electrical currents described below (e.g., prevention [installing educational signs], and sanitation [picking up trash and crumbs]) and are not discussed in detail herein. In addition, covering/tarping, crop rotation, raptor posts, and soil sterilization are considered cultural control methods that would be covered by site-specific agricultural management plans and implemented by the agricultural tenant; therefore, these methods are not described or evaluated in this PEIR. Refer to Chapter 3 through 7 of the IPM Manual for a full description of the manual treatments proposed under the IPM Program.

Manual treatments are effective for the removal of small pest populations, individual occurrences, and pest populations that occur near special-status species and their habitat or sensitive natural communities. Additionally, they are often used as a follow-up vegetation treatment in areas where larger invasive plant populations have been sprayed with an herbicide. The following is a summary of the general types of manual treatments proposed under the IPM Program that are evaluated in this PEIR.

- *Pull:* Depending on the size of the plants, the stem of the target plant would be grasped by hand or with the assistance of a weed wrench and the entire plant including the roots would be pulled out of the ground. A weed wrench is a lever-type tool that is used to pull up invasive plants that are between 1 and 6 feet tall with roots that penetrate more than a few inches into the soil; usually shrubs such as French broom (*Genista monspessulana*) are ideal candidates for a weed wrench. Pulling is not suitable in areas where there is steep terrain, where the operator cannot gain a firm stance, or where the activity may lead to disruptive erosion.
- *Dig:* For small infestations, this would be completed by using a shovel, Pulaski, or similar hand-operated digging tool to loosen the soil around the roots of a plant several inches below the surface and then lifting out the entire plant. The amount of root that must be removed varies by species.
- *Mulching:* Applying straw, shredded bark, wood chips, or similar materials to the soil surface. Mulches work by eliminating light availability to small weeds. The larger the weed, the deeper the mulch needs to be for effective control. Mulches have the added benefit of also conserving soil moisture and reducing soil erosion. Many organic types of mulch ultimately decompose into necessary plant nutrients for the following growing season.
- *Hoeing:* This is a method of removing weeds using a handheld hoe or disc by scraping the top few inches of soil to slice, pull, or bury target weeds.
- *Weedmats:* Weedmats are made of fabric or plastic and are applied to an area to stop the supply of sunlight to weeds, thereby killing them.
- *Physical Barrier/Exclusion/Habitat Modification*: Exclusion and physical barriers are typically used as a temporary preventative tool to keep target invasive animals from leaving a treatment site or wildlife from entering a treatment site while other control methods are applied. Examples include exclusionary fencing, filling/covering entry points, and concrete walls. Habitat modifications vary from eliminating brush piles to removing old rodent burrows using a tractor and ripping bar to prevent reinvasion.
- *Biological Control Agent:* Release of a biological control agent (BCA), typically an insect, that targets specific invasive species. BCAs would only be used when an approved BCA is available and no rare native plants could be impacted. The use of BCAs requires following a series of steps to evaluate the safety and efficacy of a proposed release. After host specificity studies and risk assessments have been conducted and approved, permitted BCAs are reared in large numbers and released at field sites. BCAs would be transported by vehicle in containers (jars) and released manually.
- *Trapping*: Various types of traps are set to capture target invasive animals or populations, such as feral pigs, rodents, and American bullfrogs. Trap types vary in size and application and include snap traps, box traps, live/cage traps, and submerged funnel traps. Trapping requires daily monitoring to release non-target species.

No trapping would occur within habitat for the federal Endangered Species Act (ESA) listed central California coast steelhead or south central California coast steelhead.

- *Gigging/Shooting*: Gigging is the targeted spearing of invasive fish or frogs with barbed tines mounted on a long pole. Shooting is implemented with small caliber rifles and lead-free ammunition to eliminate or haze individual invasive animals, such as frogs or feral pigs. No gigging/shooting would occur within habitat for the ESA listed central California coast steelhead or south central California coast steelhead.
- *Electrical Currents:* Electrical currents are used to temporary disable frogs and non-native fish. Twelve-volt DC electroshockers are typically mounted on small boats or backpacks, and then the electroshock current is applied to the surface of a pond. This treatment is non-specific, and would affect all aquatic species within the range of the electroshocking 'wand.' Electroshocking is not lethal, rather it shocks the affected individuals which then float to the surface where they can be netted or otherwise collected. This treatment method, therefore, must be followed by another treatment method such as hand removal or gigging. No electrical currents would be used within habitat for the ESA listed central California coast steelhead or south central California coast steelhead.

MECHANICAL TREATMENTS

Mechanical control treatments include the use of motorized equipment for activities including mowing/cutting, cultivation, discing, girdling/frilling/drilling, and flaming. Mechanical treatments can be effective for the removal of small to moderate sized pest populations. The following is a summary of the general types of manual treatments proposed under the IPM Program.

- *Mow/Cut:* Motorized cutting machines are used to mow weeds based on the size of the weed infestation. Most species would require repeated cutting throughout the growing season (generally late spring through mid-summer) or they could re-sprout from their base and continue to grow, flower, and produce seed. Mowing is carefully timed according to the phenology of each plant species to minimize the amount of re-sprouting and to avoid spreading ripe seed. Mowing is a temporary measure that controls reproductive spread and can eventually reduce populations of annual plants, but other subsequent treatments (e.g., pulling, herbicide) would be necessary to eradicate perennial plants. Mowing cannot be used on steep slopes, saturated soils, or in locations with desirable native plants unless the timing of the mowing can be selected to affect only target plants.
- *Cultivation:* Loosening and breaking up of soil to kill weeds by digging them out, burying them, breaking them apart, or drying them out. Small row-crop tractors would be used for cultivating agricultural lands (i.e., row crops) to remove invasive plants and weeds.
- *Discing:* A motorized machine with a cutting implement attached that is used to till soil where crops are to be planted or chop up unwanted weeds or crop remainders.
- *Girdle/Drill:* These techniques disrupt the connection between the roots and the leaves of a tree by cutting or chopping away the outer bark and/or the inner bark or cambium, which will slowly kill the tree. Tools typically used for this treatment include an axe, chainsaw, or drill. Often these techniques are coupled with herbicide application.
- *Green Flaming:* Specially designed small, hand-held propane torches would be used in small areas to kill dense and newly emerged green seedlings. Green flaming would usually be conducted during light rains or on wet days when forest litter or grassland thatch is not likely to catch fire and additional precautions are implemented at the time of use including bringing truck-mounted or backpack water tanks, and operating with more than one person on site. This method works well on newly emerged broom seedlings.

CHEMICAL TREATMENTS

A list of pesticides (i.e., herbicides, insecticides, a rodenticide, and a fumigant) have been selected to support the IPM Program. Because herbicides, insecticides, and rodenticides have a potential to inadvertently affect non-target plants and wildlife (e.g., offsite herbicide transport via wind or precipitation, accidental consumption of rodenticide by non-target wildlife), a toxicological analysis was conducted for the use of each compound and is included in Appendix HAZ-1. Each candidate chemical (active ingredient or product of the proposed herbicides, insecticides, and rodenticide) was reviewed and evaluated for its reported fate and transport in the environment and toxicity to humans and non-target wildlife and vegetation in Appendix HAZ-1.

Grouped by pesticide category (i.e., herbicides, rodenticide, insecticides, and fumigant), Table 2-3 provides the Authority's proposed pesticide list and includes active ingredient, product formulations, and pesticide purpose. This list of pesticides is intended only for use on the pests in properties and buildings and lands owned and managed by the Authority. Refer to Table 2-2 for the methods of chemical application associated with each IPM management category.

Table 2-3 Pesticides Selected to Support the IPM Program

Pesticide Category	Active Ingredient	Product Formulations (Manufacturer)	Purpose
Herbicides	Glyphosate	Roundup (Monsanto or Scotts Miracle-Gro)	Nonselective post-emergent broad-spectrum weed control
	Pelargonic Acid	Scythe (Dow AgroSciences)	Broad-spectrum control of many annual, biennial, and perennial broadleaf weeds
	Aminopyralid/Triclopyr	Milestone (Dow AgroSciences) Capstone (Dow AgroSciences)	Nonselective post-emergent broad-spectrum weed control
	Clopyralid	Transline (Dow AgroSciences)	Selective broadleaf weed control
	Imazapyr	Polaris (Nufarm), Stalker (BASF)	Nonselective pre-and post-emergent broad-spectrum weed control
	Clethodim	Envoy Plus (Valent)	Selective post-emergent grass weed control
	Chlorsulfuron	Telar XP (Du Pont)	Pre- and post-emergent broadleaf weed control
	Fluroxypyr 1-methylheptyl ester	Vista XRT (Dow AgroSciences)	Broadleaf annual and perennial weeds, and certain woody plants and vines
	Essential oils	WeedZap (JHBiotech)	All natural non-selective broadleaf weed control
	Dithiopyr	Dimension (Dow AgroSciences)	Pre-emergent grasses and broadleaf weed control
	Isoxaben	Gallery (Dow AgroSciences)	Pre-emergent broadleaf weed control
	Dimethylamine salt	2,4-D	Broadleaf weeds and brush control
Rodenticide	Cholecalciferol	Cholecalciferol baits	Rodent pest control (e.g., rats, mice)
Insecticides	Pyrethrin	Wasp-Freeze (BASF)	Wasp and hornet control
	Insecticidal Soap Spray	Garden Safe	Ant control
	Indoxacarb	Advion Gel Baits (DuPont)	Structural pest control (e.g., ants, cockroaches)
	Hydroprene	Gentrol Point Source (Wellmark International)	Pest control (e.g., cockroaches, beetles, moths)
	Fipronil	Maxforce Bait Stations (Bayer)	Ant control
	Boric Acid (Sodium tetraborate decahydrate)	Prescription Treatment Baits (BASF), Terro Ant Killer II (Terro)	Ant and cockroach control
	Diatomaceous earth	Diatomaceous earth	Structural pest control (e.g., ants, cockroaches)
Fumigant	Sulfuryl fluoride	Vikane, Zythor, or Master Fume	Structural pest control (e.g., termites)

Source: Appendix B and Appendix HAZ-1.

Careful and judicious use of pesticides would be an essential component of the Authority's proposed IPM Program, in which the most effective, least toxic treatment options are used to control pests. Insecticide baits would only be used in structures and buildings in tamper-proof bait stations and sprays would be used as a last resort and target specific individuals or populations (e.g., problem wasp nests). Rodenticides and fumigants are not currently used by the Authority, and would be used as a last resort to control pest infestations that create threats to human health or safety after other non-chemical treatment options are exhausted. If deemed necessary, rodenticides would only be used in structures and buildings in tamper-proof anchored bait containers to avoid non-target species interactions.

For pest treatment of a structure, fumigants may be used, if necessary. They would only be applied by certified applicators and the treated structure would be securely sealed with a tent to trap the gas inside. Fumigation would take up to three days to complete, and signs warning of the fumigation would be posted to prevent people from entering the structure. Air monitoring would be conducted prior to allowing anyone inside the treated structure to make sure fumigant levels are below U.S. Environmental Protection Agency (EPA) established limits.

Specific to herbicides, while non-chemical strategies would be employed when feasible, herbicides would be used when there is no other available reasonable means to control invasive plant populations and reduce the impacts on biodiversity and other conservation values on Authority's lands in a variety of circumstances including when:

- invasive plant occurrences cover a large area that would be infeasible to treat by other means;
- controlling invasive herbs and vines that can re-establish from roots and other structures left in the ground following removal is needed;
- controlling invasive shrubs and trees that will resprout following cutting is needed, if they are not treated with herbicide; and
- it is the safest alternative for staff when there are steep slopes or access constraints.

The Authority would evaluate herbicide characteristics, including information on the herbicide label and available information about the effectiveness of the herbicides at controlling target species, when selecting an herbicide. In general, herbicides will be used that are effective against the invasive plants, not likely to drift, leach to groundwater or wash into streams, are nontoxic to people and other organisms, will not persist in the environment, and are easy to apply. Each situation will be evaluated on a case-by-case basis, to minimize negative impacts to the environment.

Consistent with types of chemical application methods currently used on Authority lands, the following methods would be used under the proposed IPM Program to apply herbicides:

- *Cut-stump application*: Under this treatment, the woody plant would be cut close to the ground at a 90-degree or 45-degree angle with a chainsaw or pole saw. Debris would be removed from the cut stump and herbicide immediately applied to the circle of living cells. Cut-stump application would be used to selectively eliminate woody trees and shrubs. Woody plants tend to resprout frequently when cut unless treated with an herbicide.
- *Spray application*: Depending on the size of the infestation, herbicides would be applied with a backpack sprayer or, for larger areas, a tank mounted on an ATV. All methods of spraying under the IPM Program would be selective, that is, the operator (who is trained in identifying plants) would be in direct control of the sprayer, would point the spray tip directly at the target weed or pest, and would manually turn the spray equipment on and off to control the amount and direction of spray.
- *Wick application*: Under this treatment, herbicide would be applied to the target plant using a rope wick applicator for selective treatment. This method generally results in less potential for herbicide drift than spraying, although care must be taken that the applicator does not drip or overlap onto non-target plants. This method works best on plants that form a basal rosette of leaves.

As required by regulations of the California Department of Pesticide Regulation, the Authority or its contractors would continue to report all pesticide use on a monthly basis to the Santa Clara County Agriculture Department; would obtain pest control recommendations from a licensed PCA on an annual basis; would renew the Authority's Operator Identification with the County Agriculture Department; and would require key employees to obtain either a

Qualified Applicator License or a Qualified Applicator Certificate before using pesticides. Additional environmental protection measures, described in Section 2.9, would be implemented to minimize the potential for pesticide-related impacts to human health or the environment.

2.8 SPECIFIC IPM TREATMENTS BY MANAGEMENT CATEGORY

For all management categories, the Authority would prioritize preventative control techniques to minimize the need for more active pest control, such as the use of pesticides (i.e., herbicides, insecticides, and rodenticides) or mechanical treatments. Preventative control techniques would include sanitation, physical barriers and site modifications to prevent access, pest-resistant material selection to prevent animal pest infestation, early detection and rapid response, and staff and public education to prevent the spread of invasive plants. These techniques are low to no impact and are described in detail in Chapter 6 of the IPM Manual for all of the target pests in each management category (see Appendix B). The following sections describe the active pest control treatments, including manual, mechanical, and chemical controls that have a potential to result in environmental impacts and are thus evaluated for use in this PEIR.

2.8.1 IPM on Natural Lands

Natural areas make up the majority of Authority lands, and typically experience minimal levels of human use, aside from designated recreation areas. The purpose of IPM in natural areas is to preserve and restore natural resources while also maintaining safe and enjoyable human access for visitors and staff.

IPM in the Authority's natural areas focuses primarily on the control of pests that threaten the long-term viability of natural resources on Authority preserves. The Authority's goal is to maintain the long-term stability and resiliency of its natural areas. Pests that are commonly encountered on natural areas include invasive plants and invasive animals, including regulated species (i.e., plants and wildlife that are regulated under state and federal law or California Code) and feral pets. The Authority spends the majority of its IPM management efforts in natural areas on control of invasive plants. Given that the treatment options differ widely between invasive plants and animals, they are discussed in detail separately below.

MANAGING INVASIVE PLANTS ON NATURAL LANDS

The presence of invasive plants on Authority preserves creates a major challenge to achieving the conservation values of the Authority. If not well managed, invasive plant species can displace native plants and reduce native biodiversity, disrupt natural ecosystem processes, increase fire risk, and interfere with conservation grazing. Refer to Chapter 3 of the IPM Manual for a summary of all of the invasive plant species that have been found in Authority preserves.

Successful, long-term management of invasive plants requires careful planning to address the myriad factors that influence the effectiveness of invasive plant control treatments, limit their impacts on non-target species, restore native plants in treated areas, and prevent establishment of new occurrences. The Authority first employs prevention techniques, such as coordination with neighboring landowners, public engagement, and implementation of an early detection and rapid response program to prevent the establishment of new invasive plant occurrences (refer to Chapter 3 of Appendix B). A variety of treatment types can be used to control invasive plants on natural lands (refer to Table 2-2); those evaluated in this PEIR include manual, mechanical, and chemical treatment methods.

Manual and Mechanical Treatment Options for Invasive Plants on Natural Lands

Manual and mechanical treatment options for natural lands include the following: pulling, digging, scraping, cutting/mowing, weed whipping, brush cutting, girdling/frilling/drilling, and green flaming. These treatment types are described in detail in Section 2.7.1, "IPM Treatment Types," above.

Chemical Treatment Options for Natural Lands

Chemical control of annual and biennial weeds includes two strategies to treat different life stages: 1) post-emergent (i.e., direct application of herbicide to eliminate the plant), and 2) pre-emergent (i.e., treatment to prevent the germination of seeds). Herbicides are also classified as either selective or non-selective. Selective herbicides control plants in specific plant families or life stages, while allowing other plants to survive uninjured. Utilizing selective herbicides can be a powerful tool in balancing active management with protecting desirable, native vegetation types. Non-selective herbicides and application methods injure all plant species that are directly exposed to treatment, so should be directed only to the target species. Selectivity may be based on either the chemistry of the herbicide, but can change with the timing of the application. All of the herbicides listed in Table 2-3 above could be used to control invasive plants on natural lands. Application methods would include cut-stump, spray, and wick and are described in Section 2.7.1, “IPM Treatment Types,” above. Refer to Appendix HAZ-1 for specific information and evaluation for each of the herbicides proposed for use under the IPM Program.

MANAGING INVASIVE ANIMALS ON NATURAL LANDS

Invasive animals pose another threat to the Authority’s natural areas. Once established in a preserve, invasive animals compete for valuable resources and disturb the sensitive balance of natural food webs. Bullfrogs and wild pigs are examples of invasive introduced animals found in Authority preserves that physically displace or consume the native plants and wildlife that normally inhabit natural areas, or otherwise alter natural processes. Invasive animals known to occur on Authority preserves includes non-native fish and turtles, American bullfrogs, feral pigs and pets, and brown-headed cowbirds.

Invasive animal management in natural areas first focuses on modifying the behavior of humans or the habitat to moderate or eliminate invasive animal pest problems. After these prevention actions are exhausted, invasive animal populations will be managed to a defined tolerance level. Tolerance levels focus on reducing the pest population down to a level that does not cause substantial harm to natural resources; does not cause severe economic harm and does not cause disruption of natural processes or severe displacement of native species. A variety of physical methods can be used to control invasive animals on natural lands (refer to Table 2-2); those evaluated in this PEIR are further described below.

Manual Treatment Options for Invasive Animals on Natural Lands

<u>Non-Native Fish</u>

- *Habitat modification (pond draining)*. The Authority would temporarily drain a man-made pond where non-native fish are known to occur. To control these populations, ponds are typically drained for sufficient time to eliminate all non-native fish species, then refilled. Many non-native fish species are managed by the California Department of Fish and Wildlife (CDFW), thus special permits are required and would be obtained before pond draining.

<u>Non-Native Turtles</u>

- *Trapping and habitat modification (pond draining)*. The Authority would attempt to trap non-native turtles and remove them in compliance with CDFW regulations when they share habitat with protected, native species. Traps are designed specific to the target species and meant to capture the turtles without harm. Traps would be checked daily for release and documentation of any native species and removal of any non-native species. A qualified biologist would determine if any native species are present in the trapping area and would consult with CDFW and the U.S. Fish and Wildlife Service (USFWS) if special-status species are present. In special cases, ponds would be drained for sufficient time to collect and eliminate non-native amphibian species as described below for bullfrogs.

<u>American Bullfrogs (Bullfrogs)</u>

Bullfrogs are classified by CDFW as a game amphibian and are regulated by state fishing regulations. A special permit will be required from CDFW prior to targeting bullfrogs and if special-status species are present, a qualified biologist will need to be present.

- *Habitat modification (pond draining)*. Pond draining is one of the most common methods used for bullfrog control in California, especially where protected species may be present such as the native California red-legged frog. American bullfrogs need a perennial water source to complete their life cycle. In contrast, California red-legged frogs and California tiger salamanders only need water during their breeding cycle. The USFWS California red-legged frog Recovery Plan recommends draining ponds that contain both bullfrog and California red-legged frog species every year to reduce the habitat suitability for bullfrogs.
- *Physical barriers (fencing)*. Exclusionary fencing to keep bullfrogs from entering non-infested wetlands is a temporary tool that would be used while other control methods are applied concurrently. Fencing is not considered a long-term solution because it disrupts movement of other wildlife, can entrap non-target wildlife species, and may disrupt the natural processes of the wetlands. Exclusionary fences are useful during pond draining to limit the potential for dispersal of bullfrogs out of the treatment area. Exclusionary fencing may also be used in conjunction with funnel traps to collect bullfrogs as they attempt to disperse from drying ponds.
- *Trapping*. Submerged funnel traps and floating cage traps can be used to control different life stages of bullfrogs. Funnel traps designed for catching baitfish can be used to live capture bullfrog tadpoles. Floating cage traps have been successfully used to catch adult frogs. Though trapping is a recently-developed treatment method for bullfrogs, it may be effective especially where other sensitive amphibian species are present to which impacts must be avoided.
- *Gigging or shooting*. Gigging or shooting bullfrogs would be implemented with small caliber air rifles and lead-free ammunition to eliminate individual adult bullfrogs. Gigging is the targeted spearing of fish or frogs with barbed tines mounted on a long pole. Both gigging and shooting are effective and humane methods for selective removal of target adult bullfrogs. However, this treatment method alone will rarely eradicate bullfrogs from the target area because only a portion of adults are usually found, and it does not control eggs or larval stages. Egg masses can also be collected to remove additional life stages at the appropriate time of year.
- *Electrical currents*. Use of electrical currents (electroshocking) to temporarily disable frogs in netting and gigging operations have proved to be effective in some control programs. Electroshockers would be mounted either on small boats or on backpacks, then the electroshock current would be applied to the surface of the wetland. This treatment is non-specific and will affect all aquatic species within the range of the electroshocking 'wand'. Electroshocking is non-lethal, rather it shocks and lifts the affected individuals to the surface where they can be netted or otherwise collected. This treatment method, therefore, must be followed by another treatment method such as hand removal or gigging. Even with follow-up control of individuals found by electroshocking, this treatment method alone will rarely eradicate bullfrogs from the target area because only a portion of adults are usually found, and it does not control eggs or larval stages.

Feral Pigs

The Authority would work with CDFW to develop a management program to capture feral pigs using baited traps and humane termination (i.e., immediately fatal firearm shot). Permitting would be arranged through a memorandum of understanding for pig depredation across all properties or through a pig depredation permit on a case by case basis. As part of this effort, the Authority would coordinate with other regional land management agencies that are controlling feral pig populations.

- *Physical barriers (fencing)*. Exclusion of pigs with pig-proof fencing can be effective in preventing high value areas from being invaded by pigs. Fencing must be maintained annually to be effective. Pig-proof fencing is usually very expensive to install and maintain, and also has the possibility of restricting the movement of native animal species. It is an effective strategy for protecting extremely high value natural areas, agricultural lands, or archeological sites.
- *Trapping*. Trapping is the most effective means for regulating wild pig populations on a small landscape scale. Cage traps function by attracting single or multiple pigs into traps with bait through a one-way or guillotine trap door. Since pigs have large home ranges and they can disperse over large landscapes, the trapper would scout large landscapes or use a network of camera-traps to identify locations where pigs are actively travelling and feeding. Pre-baiting increases the effectiveness of live-catch traps.

- *Shooting*. Shooting (either hunting or professional depredation) is the most common method for feral pig control throughout California and could be used by the Authority. Permitted depredation hunting with the assistance of tracking dogs or using nighttime vision aids and thermal imaging can increase the effectiveness of managing populations. Shooting methods would only employ lead-free, copper-based ammunition to reduce non-target mortality to pig carcass scavengers. Shooting would not be used in Authority preserves open to the public.

Brown-headed Cowbird

Prior to removing eggs or trapping, permits from CDFW and USFWS would be obtained. CDFW allows control of brown-headed cowbird to reduce nest parasitism on special-status species through a special letter of authorization and a scientific collecting permit. USFWS would be contacted for information for federal permitting requirements.

- *Egg removal/addling*. Removing cowbird eggs from the host nest or addling them by shaking would be used to limit cowbird impacts on hosts, using adhesive tape. These methods are cost effective and practical where small, remote populations of hosts and/or cowbirds exist. Addling may be preferable to removing eggs since some host species may desert their nest if eggs are removed. However, if the host eggs have already been damaged it may better for the host to desert this clutch and re-nest. Necessary permits from CDFW would be obtained.
- *Trapping*. Trapping is the predominant method used for cowbird population control. Trapping would require daily monitoring to supply fresh water and food for captured birds and to release non-target species. Necessary permits from CDFW would be obtained.

Feral Pets

- *Trapping*. The Authority would utilize catch pole or otherwise trap dogs, cats, turtles, rabbits and other domesticated animals found escaped or released in Authority preserves and return them to their owners, or turn them over to local animal control departments or animal shelters.

2.8.2 IPM for Agricultural Lands

The Authority currently has one agricultural preserve with row crops (the Pajaro River Agricultural Preserve) and may acquire other agricultural properties in the future. The purpose of IPM on agricultural properties is to manage pests to maintain the specific land uses (e.g., crop production), while also providing natural resource protection and visitor access. Agricultural pests that may be encountered include weeds, pathogens and insects in croplands; and rodents in farm field and buildings. For agricultural lands leased to other parties, site-specific management needs would be determined by lessees and the Authority in individual Agricultural Management Plans based on assessment of farm and field conditions, type of crops, and anticipated crop yields.

The Authority has a separate grazing program and policy for rangelands that addresses how the Authority uses grazing as a management tool to conserve biodiversity while protecting water quality, cultural resources, scenic values, and recreational opportunities. Therefore, management of rangelands is not included in this PEIR. The following section describes the manual and mechanical control treatment options (refer to Table 2-2) for pests on agricultural lands that are evaluated in this PEIR.

MANUAL AND MECHANICAL TREATMENT OPTIONS FOR PEST IN AGRICULTURAL LANDS

Manual and mechanical treatment options for controlling pests on agricultural lands that are evaluated in this PEIR include pulling, mulching, hoeing, weedmats, mowing, green flaming, discing, ~~and~~ cultivation, and rodent trapping and burrow removal. Additional methods, such as covering/tarping, crop rotation, raptor posts, and soil sterilization are included in the IPM Manual; however, as described in Section 2.7.1, "IPM Treatment Types." these are cultural control methods that would be covered by site-specific agricultural management plans and implemented by the tenant; therefore, these methods not described in detail in this PEIR. Refer to Chapter 3 through 7 of the IPM Manual for a full description of all treatment options proposed under the IPM Program. Refer to Section 2.7.1, "IPM Treatment Types," for descriptions of pulling, mulching, hoeing, weedmats, mowing, green flaming, discing, and cultivation.

2.8.3 IPM in Buildings and Structures

Authority properties include buildings such as the administrative office located in San Jose, and numerous structures such as barns, uninhabited houses, and sheds in the preserves. Certain animals and plants may be incompatible with human use of these structures or may harm the building itself. For example, rodents, ants, bats, and similar structural pest species are typically controlled in buildings when their population numbers may result in structural damage or health risks to humans. The purpose of pest control in Authority buildings is to manage pests for human health and safety and preserve the intended uses of the building structure.

As described above, the IPM Program would first use prevention, sanitation, and maintenance as the primary structural pest control treatment options to eliminate pest problems. Despite efforts to prevent pests from becoming a nuisance, pests may still establish themselves in Authority buildings, requiring more active pest control. Active pest management options would begin with natural pest controls (such as diatomaceous earth) before using chemical-based compounds, unless there is an immediate threat to human health or safety. Each situation would be assessed by Authority staff based on the pest, level of threat, and location. Active pest control would be used as a last resort, and only for specific pests, as described in more detail below under "Chemical Treatment Options in Buildings."

MANUAL, MECHANICAL, AND CHEMICAL TREATMENT OPTIONS FOR BUILDINGS AND STRUCTURES

Manual and mechanical treatment options for pest management related to buildings and structures involves prevention (e.g., keeping the inside of buildings clean and free of food), physical controls (e.g., filling cracks, pruning vegetation, using sticky or snap traps), habitat modifications (e.g., preventing entry through exclusion techniques, moving habitat/nests, ~~destroying~~ removing rodent burrows), and chemical control (e.g., use of insecticides, rodenticides, or fumigants). Structural pest infestations that pose an immediate threat to human health or public safety would warrant the use of herbicides, insecticides, rodenticides, or fumigants if non-chemical control would not effectively address the infestation. Chemical controls used would be the least harmful, most efficient treatment methods for controlling structural pests. Descriptions of treatment options by pest species that have the potential to result in adverse impacts to the environment are provided below.

Ants/Insects

- *Diatomaceous Earth*. Diatomaceous earth (DE) is a silica-based, naturally occurring mineral product that works as a generalist insect pesticide. It is composed of the fossilized silica cases of marine diatoms that have been mined from ancient marine sediments. The dusts are considered non-toxic although care should be taken to not inhale large amounts of dust during application as all mineral and wood dusts are considered hazardous in extremely large amounts. Food-grade DE is available to mix directly in human and pet foods to manage pests that occur in bulk food storage. DE works by mechanically abrading an insect's exoskeleton that leads to dehydration and eventual death of the insect. DE is non-selective so it must be used only in specific areas where the target pests travel. The dusts are not eaten – so must be applied in areas where they will make contact with the bodies of insect pests. For ant control, it is often applied to cracks and crevices and may also be used in conjunction with caulks and foams to fill problem areas.

- *Insecticidal Soap Spray*. Insecticidal soaps are specially designed mixes of fatty acids that are made to penetrate an insect's covering and dissolve its cell membranes causing dehydration and mortality. Generally, the soaps are formulated to not dissolve plant cell membranes so are safe to apply directly to plants. Insecticidal soaps are not effective on all insects, but soft bodied insects, such as Homopterans, are highly susceptible. When used for ant control, soaps are most effective in controlling the Homopteran insects on plants that attract and sustain ant colonies.

- *Boric Acid Bait*. Boric acid is a naturally occurring compound found in many fruits and vegetables, but at concentrated doses it can be an effective stomach poison for insects. Baits use low concentrations of boric acid – sodium tetraborate decahydrate – in the range of 0.5 – 5 percent to allow for ants to ingest the bait and take it back to the colony to share with other workers before there is a lethal effect. Higher concentrations risk killing the individual before it has time to take the bait back to the colony.

- *Fipronil*. Fipronil is a broad-spectrum insecticide common in household cockroach/ant baits and flea sprays for pets. When used as an ant bait, it is toxic to insects through ingestion where it blocks chloride channels in the central nervous system; resulting in excess neuronal stimulation and death of the target insect pest. It has higher binding affinity in insect receptor sites versus mammalian receptors so it is considered highly selective for insects and safe to use in human environments. It is considered one of the most effective baits for colony control of Argentine ants in situations when boric acid-based baits are less effective. Fipronil is relatively quick-acting compared to other natural pesticides. Only small amounts of bait are necessary to control ants compared to knockdown sprays, which must be applied more widely in the environment to be effective. Small amounts of fipronil will be used as a last-resort option when extremely high populations of ants must be controlled quickly.
- *Sulfuryl Fluoride*. Sulfuryl fluoride is a colorless and odorless gas that is the primary active ingredient in fumigants intended for pest control in buildings and structures. It is used by filling the airspace within a structure and placing a tent over the structure to securely trap the gas inside. The gas penetrates cracks, crevices, fabrics, and pores in wood within the structure to eliminate pests, such as drywood termites. After fumigation, the tent is removed, the structure is aerated, and the applicator conducts air monitoring to make sure sulfuryl fluoride levels do not exceed the EPA limit of 1 part per million (ppm). Residual sulfuryl fluoride released from structures after tent removal rapidly spreads out in the air; contact with sulfuryl fluoride at high levels for long periods of time is not anticipated and it is low in toxicity to wild mammals if inhaled at expected exposure levels (Bond et. al., 2017; NPIC 2019).

Cockroaches

- *DE*. Same as described above for ants and insects.
- *Boric Acid Dusts*. Same as described above for ants and insects, except boric acid dust would be used to control cockroach infestations. The dusts (when kept dry) have a long service life and provide control for many years after application. They are practically non-detectible to cockroaches, so unlike many other chemical products that cockroaches can detect and avoid, they offer one of the more effective methods for cockroach control. Boric acid dusts are highly effective for cockroach control when applied to cracks and crevices where cockroaches are known to occur. The dust is relatively slow acting that take up to 10 to 15 days to achieve effective elimination of problem insects so it should generally be used in compliment with a baiting program to achieve full control of cockroach outbreaks.
- *Hydroprene*. Hydroprene is a synthetic insect growth regulator (IGR) that mimics juvenile insect hormones to regulate insect pest populations. Although they do not poison an insect directly to cause a lethal effect, they do interrupt the development cycle of juvenile cockroaches so they do not ever reach a reproductive stage. This mode of action can be important to reducing adult populations by preventing young insects from reaching adulthood and breeding. For this same reason, hydroprene is considered highly specific to insect pests and has low toxicity for birds and mammals, species that do not possess these same types of growth hormones. IGRs are not an ideal stand-alone control, but they are effective when used in combination with other methods to reduce populations of troublesome insects.
- *Fipronil*. Same as described above for ants and insects.
- *Indoxacarb insecticidal baits*. Indoxacarb is a synthetic, non-systemic insecticide effective on chewing and sucking insects. When used as cockroach bait, it is toxic to insects through ingestion where it blocks sodium channels in the central nervous system resulting in paralysis and elimination of the target insect pest. It replaces more hazardous organophosphate insecticides while still providing a fast acting, quick knockdown pest control option. Indoxacarb is a quick acting insecticide and offers exceptional German cockroach control potential. This product is recommended for last-resort options in challenging cockroach pest control scenarios.

Mice/Rodents

All woodrats found on Authority lands are the San Francisco Dusky-footed woodrat (*Neotoma fuscipes annectens*) which is a CDFW Species of Special Concern. Control of woodrats, as with all native species, would first focus on prevention instead of physical or chemical control.

- *Snap Traps (mice and rats)*. Basic hardware store mouse and rat traps offer one of the most effective means for mouse population control. When uncontrolled populations are present, snap traps can be used to "knockdown" large populations and then maintained to keep the population under control. Time would be invested in determining where rodents are active and then setting traps in appropriate locations. Roof and Norway rats are known to be trap shy, thus pre-baiting is essential to allow rats to associate rat traps with feeding stations, a process that can take several weeks.
- *Box Traps (mice)*. Several types of box traps are available that are capable of trapping multiple individual mice per trapping event. These traps operate on the principal that mice are attracted to small openings and are naturally inquisitive. These traps are most successful for house mouse control. Traps would be inspected on a daily basis so live trapped mice can be humanely dispatched.
- *Habitat Modification (woodrats):* If they appear to be a constant source of infestation, woodrat nests within 100 feet of buildings will be moved, only after consultation with CDFW.
- *Acute Rodenticide – Cholecalciferol (Vitamin D3).* Cholecalciferol is a natural form of Vitamin D that is industrially synthesized from lanolin (sheep's wool) to produce human dietary supplements and rodent poison. In very high doses, it causes mobilization of calcium from the bone matrix to blood plasma, causing hypercalcemia and death. It is especially toxic to rodents and a single dose of toxicant acts as an acute poison. It is the only current rodenticide in California labeled for organic food production. It is considered a low risk for secondary poisoning in wildlife but can be a hazard to non-target pets that directly consume the bait. Rodenticides would only be used as a last resort in tamper-proof anchored containers.

Skunks/Opossums/Racoons

- *Habitat Modification*. Larger openings, such as under decks and porches, would be fully enclosed with plywood, concrete, or wire mesh to prevent animals from making dens under structures. If animals are already denning in the areas, one-way, hinged doors would be used to allow them out but preventing them from returning. The Authority would confirm there are no juvenile animals in the den before using one-way doors.
- *Live Box/Cage Traps*. All skunks, opossum, and raccoons are easily trapped with live box or cage traps. Trap design varies but solid wall traps are preferred for skunks to shield the trapper from skunk spray during the control operation. The use of live trapping methods requires daily monitoring and helps to ensure that non-target animals can be released unharmed. Current CDFW trapping regulations requires that trapped animals are either released immediately or euthanized, live animals may not be relocated without a permit from CDFW.

Ground Squirrels

- *Habitat Modification*. If deemed necessary, old burrows would be ~~destroyed~~ removed in the vicinity of structures and buildings to prevent reinvasion by deep ripping them to a depth of at least 20 inches, using a tractor and ripping bar(s). Simply filling in burrows with soil does not prevent reinvasion as ground squirrels easily find and reopen old burrows. If this method is used, appropriate permits would be obtained to avoid impacts to sensitive species.
- *Live Traps*. Ground squirrels may be trapped using multi-catch live traps in structures and be removed. This may be followed by exclusion to prevent ground squirrels from reentering the structure.
- *Acute Rodenticide~~– Cholecalciferol (Vitamin D3)~~*. Chemical control of ground squirrels would not be considered except under very unusual circumstances (i.e., human health and safety considerations). The Authority does not currently use rodenticides and would only use them in the future as a last resort. In the unlikely event that chemical control of ground squirrels is deemed necessary, Authority staff would consult with experts to deem the least harmful and most appropriate method of control. If new chemicals are available, these would be evaluated on a case-by-case basis, including preparation of a compound-specific health risk assessment ~~rodenticides would only be used in tamper-proof anchored containers~~.

Bats

- *Prevention/Habitat Modification*. The Authority would carefully assess where bats are entering structures and modify the building to exclude future entry, and screening or netting would be installed in obvious roof/gable areas where bats can roost. One-way trap doors to allow bats to escape roost areas after exclusionary methods are completed would be installed.

Feral Domestic Pets

- *Prevention/Habitat Modification.* Feral domestic pets can be relics of old structures. If the Authority inherits older buildings/infrastructure that support feral pets, wildlife exclusion features would be installed. In some rare cases, the Authority may consider retrofitting structures so they can no longer support animals.
- *Live Box/Cage Traps*. Feral cats are effectively captured using live box or cage traps. Because feral domestic pets may be private property, Authority staff would conduct all trapping in conjunction with local animal control departments and/or animal shelters. The use of live trapping methods requires daily monitoring and helps to ensure that non-target animals can be released unharmed.

2.8.4 IPM for Recreational Facilities and Vegetative Rights-of-Way

Recreational facilities and vegetative rights-of-way (ROW) within Authority preserves are areas where public use is most likely to occur. Recreational facilities include parking lots, roads and trail, bridges, gates, bathrooms, and picnic areas. In these areas, pests can become a nuisance to the public and are referred to as nuisance pests. Nuisance pests include species that commonly occur on Authority lands, such as stinging insects, but whose presence can be incompatible when their proximity or behavior conflict with human use of buildings and recreational facilities in the preserves. Nuisance pests in and around recreational facilities and vegetative ROW include plants, insects, and wildlife, such as mosquitos, ticks, wasps, rattlesnakes, and poison oak. Managing nuisance pests involves preventative measures, such as managing the facility so that extra resources attracting the pest are no longer found (i.e., controlling trash in picnic areas). In some cases, manual and mechanical treatments or chemical control may be required to effectively minimize a pest problem within or near recreational facilities and vegetative ROW. The manual, mechanical, and chemical treatment options for recreational facilities are described below.

MANUAL AND MECHANICAL TREATMENT OPTIONS FOR RECREATIONAL FACILITIES AND VEGETATIVE ROW

The following summarizes manual and mechanical control treatment options for recreational facilities and vegetative ROW.

Vegetative ROW Treatments

- *Mechanical mowing*. Mechanical mowing would be used to prevent vegetation from impeding roads and trails, and from encroaching on or near parking lots, gates, and stiles. Equipment includes weed whips, hedgers, chainsaws, poles saws, chippers, and tractor-operated mowers. The frequency of brushing depends on the use of the road/trail, weather conditions, and location. Areas of high use or where access is needed for safety would be brushed more frequently than remote locations.
- *Tree removal*. Hazard and downed trees would be limbed or removed if they present a fall hazard across a public facility such as a trail, are blocking roads, trail, or parking lots, or are otherwise hazardous to visitors, staff, or contractors. The trees may be dead or alive. Stumps of live trees may be treated with herbicide to prevent re-growth.
- *Scraping/grubbing*. Grubbing to bare mineral dirt would be conducted around utility poles and boxes to reduce the risk of fire.

Social Wasps

- *Habitat modification/digging*. Problem wasp nests would be physically removed with water jets or by digging them out of underground locations.

Rattlesnakes

- *Habitat modification*. Eliminate hiding places for snakes by trailheads, trail ROW, and parking areas by mowing brush, removing rock and brush piles near high use areas, and filling cracks and holes in publicly accessible buildings.
- *Trapping*. In certain areas (especially in structures and recreational facilities where humans gather and there is potential for snakebites), the Authority may elect to capture and relocate, or eliminate single problem snakes.

CHEMICAL TREATMENT OPTIONS FOR RECREATIONAL FACILITIES AND VEGETATIVE ROW

Vegetative ROW Treatments

- Chemical treatment is typically not used for ROW clearing unless perennial plants require permanent treatment (e.g., poison oak can be eliminated from specific locations with spot application of herbicides), are near paved surfaces, are around utility poles, or to reduce the risk of fire spread from ROW into natural lands by clearing the area of vegetation. Chemicals proposed for use to treat vegetative ROW include glyphosate (Roundup ProMax) and Imazpyr (Polaris), which would be applied via spray using a backpack or boom on an ATV or truck.

Mosquitos

- Where chemical control is determined to be the only viable treatment option for a specific concern to human health and safety around a recreational facility, the Authority will contact the Santa Clara County Vector Control District for assistance.

Social Wasps

- *Pyrethrin Aerosol Sprays*. Pyrethrin-type aerosol sprays containing d-trans allethrin and phenothrin would only be used where immediate threats exist to human health and safety. These aerosol sprays are extremely effective at immediately eliminating single, problem wasp nests. The pyrethrin-type sprays work as a contact neuro-poison that results in near immediate mortality of any insect. The sprays offer a relatively safe and effective means for Authority staff to respond to immediate threats of wasp nests. Contact pyrethrins are completely non-selective, so care must be taken to target only the pest wasp and not to impact other beneficial insects.

2.9 ENVIRONMENTAL PROTECTION MEASURES

The Santa Clara Valley Habitat Plan (Habitat Plan) is a habitat conservation plan and natural community conservation plan that provides take coverage under the federal Endangered Species Act and the California Endangered Species Act for several listed species for certain covered activities within the geographic scope of the Habitat Plan. The geographic scope of the Habitat Plan incorporates a large portion of Santa Clara County and contains the majority of the IPM Program Area. Species covered by the Habitat Plan include species listed as threatened and endangered under the ESA and CESA, as well as other special-status species, many of which occur within IPM Program Area preserves (refer to Table 3.2-1 in Section 3.2, Biological Resources). The Authority would seek take coverage under the Habitat Plan for IPM Program treatment activities that could result in take, with the exception of take of federally listed species from the application of the pesticides because the Habitat Plan does not provide for take coverage for that situation. Where take coverage for IPM Program activities is provided, the Authority would comply with the specific Habitat Plan minimization and avoidance measures that are required specific to each activity and each species. In addition, the specific environmental protection measures (EPMs) would be incorporated into the design of treatments under the IPM Program to avoid and minimize environmental impacts and help achieve compliance with applicable laws and regulations. Some of the biological resource EPMs specific to avoiding take may be satisfied through take coverage under the Habitat Plan and compliance with the specific Habitat Plan avoidance and minimization measures. The Authority will document which IPM Program activities and special-status species are provided take coverage under the Habitat Plan as well as the associated measures they are required to implement.

2.9.1 Air Quality Environmental Protection Measures

- **EPM AQ-1 Minimize Air Pollutant Emissions**: The Authority would implement applicable measures from the Bay Area Air Quality Management District's *Basic Construction Mitigation Measures*, for IPM activities that would involve vehicle use on unpaved roadways and the use of heavy mechanical equipment. These measures would include, but are not limited to, the following:
  - All vehicle speeds on unpaved roads will be limited to 15 mph.
  - Idling times will be minimized either by shutting equipment off when not in use or reducing the maximum idling time to 5 minutes (as required by the California airborne toxics control measure Title 13, Section 2485 of California Code of Regulations). Clear signage will be provided for Authority staff and contractors.
  - All equipment will be maintained and properly tuned in accordance with manufacturer's specifications. All equipment will be checked by a certified mechanic and determined to be running in proper condition prior to operation.

2.9.2 Biological Resource Environmental Protection Measures

- **EPM BIO-1 Pre-treatment Survey and Buffers for Aquatic Habitat**: All terrestrial treatment areas will be surveyed for the presence of lakes, ponds, streams, drainages, seeps, springs, saturated soils, or similar features that hold water at the time of treatment or typically become inundated during winter rains. Surveys will occur prior to the initial treatment within a treatment area, and the extent of aquatic features will be reverified prior to implementing treatments in subsequent years. The Authority will not conduct any ground disturbing mechanical treatments or any chemical treatments within 15 feet of any aquatic features, and broadcast spraying of herbicides will be prohibited within 50 feet of aquatic features (unless the compound is specifically registered for aquatic use). Refer to EPM BIO-8 for additional restrictions on the use of specific chemicals near California-red legged frog (CRLF) habitats, including aquatic features.
- **EPM BIO-2 Pre-treatment Surveys and Flagging for Special-Status Plants**: All treatment areas will be surveyed prior to IPM treatments to determine the potential presence of special-status plants. Special-status plants within a treatment area will be mapped and/or flagged and avoided.
- **EPM BIO-3 Limited Herbicide Use Near Special-Status Plants**: Within 15 feet of special-status plants, the Authority will not broadcast spray (i.e., boom spray from an ATV) any herbicides that could have an adverse effect on the special-status plant species present (e.g., non-selective herbicides that injure all plant species they come in contact with).
- **EPM BIO-4 Treatment Timing for Special-Status Plants**: Many special-status plants are annual plants, which persist over the summer, are dormant through the winter, with seeds that germinate in the early spring. When annual special-status plants are dormant (prior to germination), only treatments that do not affect seeds or underground parts may be used within 15 feet of them.
- **EPM BIO-5 Salvage Rare Plants Propagules**: Seed or other propagules of rare plants will be collected before treatments, as feasible, and utilized in restoration post-treatment if needed.
- **EPM BIO-6 Avoid Nesting Bird Season**: To avoid impacts to nesting birds, invasive plant control treatments will be conducted outside of the bird nesting period, so treatments would not generally occur between February 1 – August 31, if they may adversely affect native bird nests.
- **EPM BIO-7 Avoid Nesting Birds**: If invasive plant control work must be conducted during the nesting bird season (February 1 – August 31), a nesting bird survey will be conducted within 14 days of treatment. The survey will encompass the area within a 250-foot radius for raptors, and 50-foot-radius for other birds. If nesting birds are identified, work within these buffer areas will be postponed until the young have fledged or the nest is otherwise abandoned.

- **EPM BIO-8 Herbicide Restrictions for California Red-Legged Frog**: Application of herbicides by the Authority with active ingredients that are subject to the CRLF Injunction (Center for Biological Diversity v. U.S. Environmental Protection Agency [2006] Case No.: 02-1580-JSW) would be prohibited within 60 feet of CRLF critical habitats, upland habitats, and aquatic features.
- **EPM BIO-9 Avoid Monarch Butterfly Overwintering Sites:** Although it is unlikely that monarch butterfly overwintering sites will occur within treatment areas, to avoid potential impacts to overwintering monarchs, the Authority will survey for overwintering colonies where treatment areas occur within suitable overwintering habitat (e.g., conifer stands and eucalyptus stands) during the overwintering season (October through March) within 14 days before starting treatment. If overwintering colonies are identified, the site will be flagged and treatments that may disturb the colony (e.g., mechanical treatments or chemical treatments) will not occur within the site while the colony is present.
- **EPM BIO-10 Pre-treatment Surveys and Flagging for Monarch Butterfly Host Plants**: All treatment areas will be surveyed prior to IPM treatments to determine the potential presence of the monarch butterfly host plant milkweed (*Asclepias* spp.). Milkweed plants within a treatment area will be mapped and/or flagged and avoided.
- **EPM BIO-11 Limited Herbicide Use Near Monarch Butterfly Host Plants**: Within 15 feet of monarch host plants, the Authority will not broadcast spray (i.e., boom spray from an ATV) any herbicides that could have an adverse effect on the monarch butterfly host plants. (e.g., non-selective herbicides that injure all plant species they come in contact with).

2.9.3 Hazardous Material and Public Health and Safety Environmental Protection Measures

- **EPM HAZ-1 Maintain All Equipment:** The Authority will maintain all diesel- and gasoline-powered equipment per manufacturer's specifications, and in compliance with all state and federal emissions requirements. Maintenance records will be available for verification. Before the start of treatment activities, the Authority (or contractor) will inspect all equipment for leaks and inspect everyday thereafter until equipment is removed from the site. Any equipment found leaking will be promptly removed.
- **EPM HAZ-2 Require Spark Arrestors**: The Authority will require all mechanized hand tools to have federal- or state-approved spark arrestors.
- **EPM HAZ-3 Prohibit Smoking in Vegetated Areas:** The Authority will require that smoking is only permitted in designated smoking areas barren or cleared to mineral soil at least 3 feet in diameter (PRC Section 4423.4), if smoking is permitted at all.
- **EPM HAZ-4 Pesticide Handling and Mixing:** The following EPMs will be implemented by the Authority when handling or mixing pesticides.
  - Authority staff will comply with all federal, State, and local pesticide use laws and regulations.
  - As a precaution against spilling, spray tanks will not be left unattended during filling. All pesticide spray equipment will be properly cleaned.
  - Where possible, rinsate will be used as part of the water in the sprayer tank and applied to treatment areas.
  - All pesticide containers will be triple rinsed, and the rinsate will be used as water in the sprayer tank and applied to treatment areas.
  - When a pesticide container is marked as recyclable, Authority staff will deliver the triple rinsed pesticide containers to the appropriate herbicide container collection site.
  - All unused pesticides would be properly discarded at a local "safe send" collection.

- Pesticides and pesticide containers will be lawfully stored, handled, and disposed of in accordance with the label and in a manner that would safeguard human, fish, and wildlife health and prevent soil and water contamination.
- Authority staff will consider the water quality parameters (e.g., pH, hardness) that are important to ensure the greatest efficacy when specified on the pesticide label.
- All pesticide spills will be addressed immediately.

▸ **EPM HAZ-5 Pesticide Application:** The following EPMs will be implemented by the Authority when applying pesticides.

- Authority staff will comply with all federal, State, and local pesticide use laws and regulations. For example, Authority staff will use application equipment and apply rates for the specific pest(s) identified on the pesticide label.
- Before each treatment season and before mixing or applying any product for the first time each season, all applicators will review the product label.
- Applicators will follow all label recommendations regarding buffer zones around wetlands and waters, where applicable.
- Only herbicides registered for aquatic use will be broadcast sprayed within 50 feet of aquatic resources, and no pesticides would be used within 15 feet of aquatic resources (i.e., surface waters, wetlands, seasonal streams, or locations where groundwater is present at the soil surface).
- Applicators will use low impact herbicide application techniques (e.g., spot treatment and cut stump applications) rather than spray applications (e.g., boom sprayer or other larger tank wand applications), wherever practical.
- Applicators will use low volume rather than high volume spray applications when the low impact methods described above are not feasible or practical to maximize herbicide effectiveness and ensure correct and uniform application rates.
- Applicators will use and adjust spray equipment to apply the coarsest and largest droplet size with optimal coverage of the target species to reduce the potential for drift.
- Applicators will use drift reduction technologies such as low-drift nozzles, where possible.
- Spraying will occur during low and consistent direction wind conditions (average less than 7 mph; preferably 3-5 mph) and moderate temperatures (less than 85 degrees Fahrenheit) to prevent unintended drift.
- Applicators will avoid spraying during inversion conditions (often associated with calm or very low wind conditions) that can cause large-scale herbicide drift to non-target areas.
- Equipment will be calibrated regularly to ensure that the proper rate of pesticide is applied to the target area or species.
- Spray applications will be made at the lowest height for uniform coverage of target pests to minimize or eliminate potential drift.
- If windy conditions frequently occur during afternoons, spraying (especially boom treatments) will be conducted during early morning hours.
- Herbicide applications will not be conducted on days with greater than 30 percent forecast for rain within six hours, except for pesticides that are rapidly rain fast or need rain to activate the product to minimize or eliminate potential runoff. Within 100 feet of aquatic resources (surface waters, wetlands, seasonal streams, or locations where groundwater is present at the soil surface) this rain-free window will be increased to 24 hours.
- Applicators will use environmentally safe drift retardant adjuvants during spray applications, especially adjacent to sensitive areas.

- Applicators will use a non-toxic dye to aid in identifying treated target areas and any areas of overspray or drift. Dye would also aid in detecting equipment leaks. If a leak is discovered, application would stop immediately and the sprayer would not be used until repairs are made.
- When drift cannot be sufficiently reduced through altering equipment set up and application techniques, buffer zones in addition to those described above will be identified to protect sensitive areas downwind of applications.
- When an application is required adjacent to a sensitive habitat area, it will only occur when the wind is blowing in the opposite direction of the sensitive area.
- To eliminate unnecessary pesticide applications, Authority staff will examine the target area for the presence of expected pests before applying a pesticide product.
- Authority staff will consider the timing of a pesticide application to ensure that native plants are protected (e.g., senescence) while effectively treating invasive plants.
- Application equipment (e.g., backpack sprayer, transport vehicles) will be thoroughly cleaned and Personal Protective Equipment (PPE) removed and properly disposed of after treatments.

- **EPM HAZ-6 Notification of Pesticide Use in the Vicinity of Public Areas:** Signage will be posted at each pedestrian entry point notifying the public of upcoming and recent pesticide application locations, and footpaths and trails will be closed to the public during pesticide application. Signs will be posted before the start of treatment and notification would remain in place for at least 72 hours after treatment ceases.

2.10 POTENTIAL PERMITS AND APPROVALS REQUIRED

Table 2-4 discloses the potential permits and approvals that could be required to implement the IPM Program, depending on the resources encountered in the Authority's preserves.

Table 2-4 Potential Permits and Approvals Required for IPM Program Activities

Permit	Agency	Purpose
Section 404 Permit (Nationwide or Regional General Permit)	U.S. Army Corps of Engineers	Minimize and mitigate impacts to wetlands, waters of the U.S. and aquatic resources.
Section 10 Incidental Take Permit or Section 7 Consultation (if a federal agency is involved)	U.S. Fish and Wildlife Service	To minimize impacts to special-status species listed under FESA (*only required for activities that would result in "take" of FESA listed species if take coverage through the Santa Clara Valley HCP is not obtained*).
Section 10(a)(1)(A) Recovery Permit	U.S. Fish and Wildlife Service	Avoid and minimize impacts on federally listed species by specific management actions (*may be required for individuals performing non-native turtle and bullfrog removal by methods not covered under sport fishing regulations*).
Section 1602 Fish and Game Code Lake and Streambed Alteration Agreement	California Department of Fish and Wildlife	Minimize impacts to any river, stream, or lake and activities that may affect fish and wildlife resources.
Section 2081 Incidental Take Permit	California Department of Fish and Wildlife	To minimize impacts to special-status species listed under CESA (*only required for activities that would result in "take" of CESA listed species if take coverage through the Santa Clara Valley HCP is not obtained*).
Section 4181 Fish and Game Code Depredation Permit to Take Wild Pigs	California Department of Fish and Wildlife	Authorization to capture or kill feral pigs to reduce damage caused by these invasive animals.
Section 650 Fish and Game Code Scientific Collection Permit	California Department of Fish and Wildlife	Authorization to collect brown-headed cowbirds. Also, authorization to collect bullfrogs and non-native turtles by methods not covered under sport fishing regulations.

Permit	Agency	Purpose
Request for Coverage under the Santa Clara Valley HCP	Santa Clara Valley Habitat Agency	Provides take authorization for listed species from U.S. Fish and Wildlife Service and/or California Department of Fish and Wildlife.
Restricted Materials Use Permit	Santa Clara County Agricultural Commissioner	Minimize adverse effects associated with using restricted use pesticides.
Section 401 Water Quality Certification	San Francisco Bay and Central Coast Regional Water Quality Control Boards	Minimize impacts to water quality in combination with the Section 404 permit and potentially related to other potential sources of sediment or pollutants entering waters of the state.

Notes: CESA = California Endangered Species Act, ESA = Federal Endangered Species Act, HCP = Habitat Conservation Plan

Source: Compiled by Ascent Environmental in 2019

3 ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

3.1 APPROACH TO THE ENVIRONMENTAL ANALYSIS

This ~~Draft~~ Program Environmental Impact Report (PEIR) evaluates and discloses the environmental impacts associated with implementation of the Integrated Pest Management (IPM) Program, in accordance with the California Environmental Quality Act (CEQA) (Public Resources Code [PRC] Section 21000, et seq.) and the State CEQA Guidelines (California Code of Regulation, Title 14, Chapter 3, Section 1500, et seq.). The Executive Summary includes an analysis of the program's growth inducing impacts, as required by Section 21100(b)(5) of CEQA. Sections 3.2 through 3.8 of this ~~Draft~~ PEIR present a discussion of regulatory background, existing conditions, environmental impacts associated with implementation of the IPM Program, mitigation measures to reduce potentially significant impacts, and residual level of significance (i.e., after application of mitigation, including impacts that would remain significant and unavoidable after application of all feasible mitigation measures) for each environmental topic required by the State CEQA Guidelines. Issues evaluated in these sections were also identified for review in the Notice of Preparation prepared for the IPM Program (see Appendix A of this ~~Draft~~ PEIR). Chapter 4 of this ~~Draft~~ PEIR, "Cumulative Impacts," presents an analysis of the IPM Program's impacts considered together with other past, present, and probable future projects producing related impacts, as required by Section 15130 of the State CEQA Guidelines. Chapter 5, "Alternatives," presents a reasonable range of alternatives and evaluates the environmental effects of those alternatives relative to the proposed IPM Program, as required by Section 15126.6 of the State CEQA Guidelines.

Sections 3.2 through 3.8 of this ~~Draft~~ PEIR each include the following subsections.

Regulatory Setting: This subsection presents information on the laws, regulations, plans, and policies that relate to the environmental topic being discussed. Regulations originating from the federal, state, and local levels are each discussed as appropriate.

Environmental Setting: This subsection presents the existing environmental conditions in the IPM Program Area and in the surrounding area as appropriate, at the time that the Notice of Preparation was published, in accordance with State CEQA Guidelines Section 15125. The discussions of the environmental setting focus on information relevant to the issue under evaluation. The extent of the environmental setting area evaluated (i.e., the study area) differs among resources, depending on the locations where impacts would be expected. For example, air quality impacts are assessed for the air basin, whereas aesthetic impacts only need to be assessed for the IPM Program Area vicinity where IPM treatments and associated visual changes could occur.

Environmental Impacts and Mitigation Measures: This subsection presents thresholds of significance for evaluating potential impacts and discusses the potential for adverse effects to the environment from implementation of the IPM Program, including areas beyond the IPM Program Area boundaries, in accordance with State CEQA Guidelines Section 15126.2. The methodology for the impact analysis is described, including technical studies upon which the analyses rely. The thresholds of significance are defined and thresholds for which the IPM Program would have no significant impacts are disclosed and dismissed from further evaluation. IPM Program impacts and mitigation measures are numbered sequentially in each subsection (Impact 3.2-1, Impact 3.2-2, Impact 3.2-3, etc.). A summary impact statement precedes a more detailed discussion of the environmental impact. The discussion includes the analysis, rationale, and substantial evidence upon which conclusions are drawn. The determination of level of significance of the impact is defined in bold text. A "less-than-significant" impact is one that would not result in a substantial adverse change in the physical environment. A "potentially significant" impact or "significant" impact is one that would result in a substantial adverse change in the physical environment; both are treated the same under CEQA in terms of procedural requirements and the need to identify feasible mitigation. Mitigation measures are identified, as feasible, to avoid, minimize, rectify, reduce, or compensate for significant or potentially significant impacts, in accordance with the State CEQA Guidelines Section 15126.4. Unless otherwise noted, the mitigation measures presented are recommended in the ~~Draft~~ PEIR for consideration by the Authority to adopt as conditions of approval.

Where an existing law, regulation, or permit specifies mandatory and prescriptive actions about how to fulfill the regulatory requirement as part of the project's definition, leaving little discretion in its implementation, and would avoid an impact or maintain it at a less-than-significant level, the environmental protection afforded by the regulation is considered before determining impact significance. Where existing laws or regulations specify a mandatory permit process for future projects, performance standards without prescriptive actions to accomplish them, or other requirements that allow substantial discretion in how they are accomplished, or have a substantial compensatory component, the level of significance is determined before applying the influence of the regulatory requirements. In this circumstance, the impact would be potentially significant or significant, and the regulatory requirements would be included as a mitigation measure.

This subsection also describes whether mitigation measures would reduce IPM Program impacts to less-than-significant levels. Significant-and-unavoidable impacts are identified as appropriate in accordance with State CEQA Guidelines Section 15126.2(b). Significant-and-unavoidable impacts are also summarized in the Executive Summary.

References: The full references associated with the parenthetical references found throughout Sections 3.1 through 3.8 can be found in Chapter 7, "References," organized by section number.

3.1.1 Effects Found Not to Be Significant

The discussion of potential effects on the physical environment in PEIR Sections 3.2 through 3.8 is focused on those impacts that may be significant or potentially significant. CEQA allows a lead agency to limit the detail of discussion of the environmental effects that are not significant or potentially significant (PRC Section 21100, California Code of Regulations Sections 15126.2[a] and 15128 of the State CEQA Guidelines). Implementation of the IPM Program would have no significant impacts to several environmental topic areas; these resources, and a brief explanation as to why no significant impact would occur, are summarized below.

AIR QUALITY AND GREENHOUSE GAS EMISSIONS

The IPM Program Area is in the San Francisco Bay Area Air Basin (SFBAAB) and is within the jurisdiction of the Bay Area Air Quality Management District (BAAQMD). BAAQMD attains and maintains air quality conditions in the SFBAAB through a comprehensive program that includes the preparation of plans and programs for the attainment of ambient-air quality standards and to address climate change, adoption and enforcement of rules and regulations, and issuance of permits for stationary sources.

The IPM Program is a pest management program that does not include new construction activities or the establishment of any new stationary sources of criteria air pollutant and greenhouse gas (GHG) emissions. Pest management activities implemented under the IPM Program may involve the use of small power tools; mechanical equipment such as weed whips, chainsaws, tractors, and mowers; ATVs for herbicide application; and vehicles for worker commute, which would generate temporary and periodic exhaust emissions of criteria air pollutants and GHGs. Pest management activities that involve travel on unpaved roads or ground disturbance, such as digging, discing, and scraping/grubbing could result in fugitive dust emissions. The hand tools and small power tools proposed for use generate zero to small amounts of air pollutants and GHG emissions. Larger equipment such as tractors or ATVs, which generate greater emissions, would be used infrequently, and it is anticipated that the IPM Program would be implemented using the Authority's existing vehicles and equipment and would not require the purchase of additional mechanical equipment. As discussed in Section 2.7, "Proposed IPM Program Treatment Activities," IPM activities would generally be short in duration, involve minimal pieces of emissions-generating equipment, and require only one to three Authority staff members to implement. Currently, up to 20 treatment activities are conducted simultaneously across the Authority's preserves. Implementation of the IPM Program would be reasonably expected to increase the number of simultaneous treatment activities by four treatments within the IPM Program Area. Thus, a substantial increase in emissions generating activities or fugitive dust over existing conditions would not occur. Furthermore, the Authority would implement environmental protection measure AQ-1

(EPM AQ-1) to comply with all applicable BAAQMD *Basic Construction Mitigation Measures* to reduce fugitive dust emissions and limit equipment idling time to 5 minutes to minimize exhaust emissions of air pollutants and GHGs.

Green flaming, a specialized method for controlling infestations of new invasive plant seedlings, would also be implemented occasionally under the IPM Program. The use of hand torches for green flaming would emit small quantities criteria air pollutants and GHGs. BAAQMD Regulation 5 forbids open burning within the air district with certain exceptions. Section 5-110.3 of the regulation provides an exemption for the type of green flaming proposed under the IPM Program, because actual combustion would be short-term and limited to when the torch is in use. Furthermore, because implementation of the IPM Program is to increase the number of simultaneous treatment activities by up to four treatments within the IPM Program Area, a substantial increase in emissions generating activities, including green flaming, would not occur. Thus, no significant air quality or GHG impacts would occur due to green flaming.

For these reasons, implementation of the IPM Program would not result in a cumulatively considerable net increase in criteria air pollutant or GHG emissions, nor would it expose sensitive receptors to substantial air pollutant concentrations or odors. Additionally, the IPM Program does not include new housing and only one to two new staff would be hired, thus, no substantial population growth would occur. Consequently, the IPM Program would not conflict with or obstruct implementation of BAAQMD's air quality planning efforts. Therefore, no significant air quality or GHG impacts would occur. These issues are not evaluated further in this ~~Draft~~ PEIR.

AGRICULTURAL AND FORESTRY RESOURCES

The IPM Program Area includes two agricultural preserves. The Pajaro River Agricultural Preserve supports row crops, contains parcels under Williamson Act contracts, and is mapped by the California Department of Conservation as Prime Farmland (Santa Clara County n.d.; DOC 2016a; DOC 2016b). The North Coyote Valley Open Space Preserve contains areas mapped by the California Department of Conservation as Grazing Land and Farmland of Local Importance (DOC 2016a; DOC 2016b). The IPM Program Area does not include any lands zoned as timberland and no timberland production activities are currently undertaken on Authority lands (Santa Clara County 2016). However, as shown in Table 3.3-2, "Land Cover Types in the IPM Program Area by Preserve," the IPM Program Area contains substantial acres of forested lands, including Blue Oak-Foothill Pine Woodland, Blue Oak Forest/Woodland, California Bay Forest, Central Coast Riparian Forests, Coast Live Oak Forest/Woodland, Douglas Fir Forest, Montane Hardwoods, Redwood Forest, Serpentine Hardwoods, and Valley Oak Forest/Woodland.

The purpose of the IPM Program is to manage pests to maintain the specific land uses (e.g., crop production), while also providing natural resource protection. Although the Authority would conduct pest management activities within farmlands and forested lands in the IPM Program Area, these activities would be implemented to promote the long-term viability of these lands and no land use conversions would occur. Therefore, pest management activities under the IPM Program would not result in conversion of important Farmland to non-agricultural uses nor cause other changes that would result in the conversion of important Farmland. Similarly, the IPM Program would not result in the loss of forest land or convert forest land to non-forest use. Therefore, no significant impacts to farmlands or forested lands would occur. This issue is not evaluated further in this ~~Draft~~ PEIR.

ENERGY

Pest management activities under the IPM Program would involve the use of small power tools; mechanical equipment such as weed whips, chainsaws, tractors, and mowers; ATVs for herbicide application; and vehicles for worker commute. The temporary use of energy (i.e., diesel fuel and gasoline) is required to operate these types of equipment and vehicles during pest management activities. As discussed in Section 2.7, "Proposed IPM Program Treatment Activities," IPM activities would generally be short in duration, involve minimal pieces of mechanical equipment, and require only one to three Authority staff members to implement. The Authority anticipates that with implementation of the IPM Program, one to two additional staff may be hired, and the number of treatment activities occurring simultaneously would be reasonably expected to increase by up to four treatments within the IPM Program Area.

This would be a small increase in energy consumption over existing operations and maintenance activities. This small increase in energy consumption required to implement the IPM Program would not be wasteful or inefficient because implementation of the IPM Program would benefit the public and the environment by removing invasive and nuisance pests from the IPM Program Area, thereby enhancing safety for public recreational uses of the preserves as well as native vegetation and habitats. Therefore, no inefficient, wasteful, or unnecessary consumption of energy would occur. This issue is not evaluated further in this ~~Draft~~ PEIR.

GEOLOGY AND SOILS

The IPM Program Area includes seismically active areas that could experience significant ground shaking or result in fault rupture, seismic-related ground failures, and/or landsliding; as well as areas with unstable soils, expansive soils, and erosive soils (Santa Clara County 2012).

The IPM Program provides comprehensive guidelines and procedures for the careful management of pests throughout the Authority's preserves while protecting natural resources and public health. The IPM Program does not include the construction of any new structures, cut, fill, or other grading activities that could be subject to seismic hazards, unstable geological conditions, or expansive soils. In addition, major ground-disturbing work on steep hillsides (that could potentially induce landslides) would not occur. Although some pest management activities such as grubbing and removal of targeted invasive plant species could potentially expose soil to increased erosion, the IPM Manual specifies selection of appropriate treatment types for site-specific conditions and includes restoration measures where invasive plant control has rendered the soil vulnerable to erosion (Appendix B). Lastly, the IPM Program does not include any new structures or features that would cause growth in the IPM Program Area, thereby exposing more people to potential geologic hazards. Therefore, no significant impacts regarding geological hazards or soil erosion would occur. This issue is not evaluated further in this ~~Draft~~ PEIR.

LAND USE AND PLANNING

Land use and planning impacts would occur if the IPM Program would physically divide an established community (e.g., a freeway dividing a populated residential community) or if it would conflict with a land use policy adopted for the purpose of avoiding an environmental effect. The IPM Program is program for managing pests on Authority preserves and would not involve the construction of new development or infrastructure that would physically divide a community.

The Santa Clara County General Plan Land Use Map designates the IPM Program Area as Agriculture; Hillsides; Ranchlands; Regional Parks, Existing; and Other Public Open Space Lands (Santa Clara County 2016). These designations fall under the "Resource Conservation Area" designation, which is intended to encourage land uses and densities appropriate to rural unincorporated areas that also preserve rural character; conserve natural, scenic, and cultural resources; protect public health and safety from natural and man-made hazards; preserve agriculture and prime agricultural soils; protect watersheds and water quality; enhance air quality; and minimize the demand for and cost of public services and facilities (Santa Clara County 1994). The Authority's mission is to conserve the natural environment, support agriculture, and connect people to nature, by protecting open spaces, natural areas, and working farms and ranches. The IPM Program was designed to be consistent with the Authority's mission and with the Authority's IPM Policy (see Section 2.4, "Policy and Planning Context for the IPM Program") and would not change any existing land uses. Thus, the IPM Program would be consistent with local land use plans and would not conflict with any land use policies adopted for the purpose of avoiding an environmental effect. No significant impacts regarding land use would occur and this issue is not evaluated further in this ~~Draft~~ PEIR.

MINERAL RESOURCES

No locally important mineral resource recovery sites are located within the IPM Program area. A portion of the Coyote Ridge Open Space Preserve is classified as MRZ-3, which is an area that contains mineral deposits, but their significance cannot be determined (DOC 1987; Kohler-Antablin 1999). The IPM Program would not result in land use changes, zoning changes, or development which would prevent recovery of minerals within Authority lands or adjacent sites. Therefore, no significant impacts regarding mineral resources would occur, and this issue is not evaluated further in this ~~Draft~~ PEIR.

NOISE

Noise-sensitive receptors in the IPM Program Area include recreational visitors on Authority lands and occupied residences adjacent to Authority lands. The majority of the IPM Program Area preserves are closed to the public and located within rural areas where sensitive receptors are sparse. The Coyote Valley Open Space Preserve, Rancho Canada del Oro Open Space Preserve, and Sierra Vista Open Space Preserve are currently open to the public, and there are low-density residential developments adjacent to the Santa Teresa Foothills Open Space Preserve and El Toro Open Space Preserve. As discussed in Section 3.4, "Hazards and Hazardous Materials," the IPM Program Area is not located in any airport land use plans and no airports are present within 2 miles of the IPM Program Area. Furthermore, the IPM Program would not result in additional residences or population growth in the IPM Program Area, thus the IPM Program would not result in the exposure of more people to noise residing or working in the project area.

Pest management activities under the IPM Program would use mechanical equipment and vehicles such as chainsaws, weed whips, tractors, and ATVs within the IPM Program Area, which would generate noise and limited amounts of vibration. However, the Authority anticipates that implementation of the IPM Program could result in four additional treatment activities occurring simultaneously within the IPM Program Area. Given this slight increase in IPM activities that would occur relative to existing conditions, the IPM Program would not result in a substantial in increase in noise levels or vibration over existing levels. Additionally, all IPM activities would occur during daytime hours when people are less sensitive to noise impacts and would be spread out across the 16,446-acre IPM Program Area. Therefore, no significant impacts related to noise or vibration would occur from implementation of the IPM Program and these issues are not evaluated further in this ~~Draft~~ PEIR.

POPULATION AND HOUSING

A project can have impacts related to population and housing if it fosters economic or population growth, directly or indirectly, in a project area or surrounding environment that induces growth, or by displacing existing housing that must be replaced elsewhere. Substantial growth inducement can result from projects that include the construction of new residences or the removal of an obstacle to growth, such as expansion of a wastewater treatment plant, extending transportation routes into previously undeveloped areas; or establishing major new employment opportunities. The IPM Program would guide pest management activities on existing Authority preserves. No new housing or infrastructure are proposed as a part of the IPM Program. Only one to two additional staff are projected to be hired to implement to IPM Program, which would not be considered a substantial increase in employment. Furthermore, the IPM Program would not displace housing or people such that replacement housing would be required to be constructed elsewhere. Therefore, no significant impacts to population or housing would occur from implementation of the IPM Program and this issue is not evaluated further in this ~~Draft~~ PEIR.

PUBLIC SERVICES AND UTILITIES

As discussed above in "Population and Housing," the IPM Program would guide pest management activities on existing Authority preserves and no new housing or infrastructure are proposed. Only one to two additional staff are projected to be hired to implement to IPM Program, which would not be considered a substantial increase in employment. Therefore, the IPM Program would not result in increased demand for public services and no significant impacts from the provision of new or physically altered public services would occur from implementation of the IPM Program. In addition, given that the IPM Program would not result in population growth, no additional water supply or wastewater treatment services would be needed. Implementation of the IPM Program would also not be anticipated to result in any substantial change in the level of solid waste generated on or from the IPM Program Area.

Therefore, the IPM Program would not affect permitted capacity of local or regional solid waste disposal services nor would it affect existing levels of compliance with federal, state, and local statutes and regulations regarding solid waste. These issues are not evaluated further in this ~~Draft~~ PEIR.

TRANSPORTATION

Section 15064.3 was added to the State CEQA Guidelines and became effective December 28, 2018 as part of a comprehensive guidelines update. The section addresses the determination of significance for transportation impacts, which requires that the analysis be based on vehicle miles traveled (VMT) instead of a congestion metric (such as level-of-service). Pursuant to State CEQA Guidelines Section 15064.3(c), this change in analysis may be implemented now and is mandated to be addressed beginning July 1, 2020. Because the IPM Program and associated IPM Manual guide long-term management of the IPM Program Area, VMT is used in this analysis. The Technical Advisory on Evaluating Transportation Impacts (OPR 2018) notes that projects that generate or attract fewer than 110 trips per day generally may be assumed to cause a less-than-significant transportation impact, absent substantial evidence indicating otherwise (OPR 2018). Therefore, for the purposes of this analysis, if the IPM Program as a whole (i.e., the net increase in IPM activities resulting from implementation of the program) would not generate 110 or more daily vehicle trips, it would not require a transportation analysis study and would also be assumed, using OPR guidance, to result in a less than significant VMT impact.

The IPM Program would expand upon the types, frequency, and geographic extent of existing IPM activities conducted by the Authority and includes additional treatment types and methods. The Authority anticipates that with implementation of the IPM Program, one to two additional staff may be hired, and the number of treatment activities occurring simultaneously would be reasonably be expected to increase by four treatments within the IPM Program Area. Currently, up to 20 treatment activities are conducted simultaneously across the Authority's preserves, and each activity requires one to three Authority staff members to implement. Implementation of the IPM Program could result in four additional treatment activities occurring simultaneously within the IPM Program area. Conservatively assuming that each new treatment activity would include three staff members, and that each staff member would commute to and from the treatment site alone and generate two daily trips, the IPM Program would result in approximately 24 new daily trips. Therefore, the IPM Program would generate far fewer than 110 daily vehicle trips during implementation of the IPM Program. Consistent with OPR guidance, no significant VMT impact would occur with implementation of the IPM Program.

In addition, the IPM Program would not affect existing transit, roadways, bicycle, or pedestrian facilities, nor would it alter the level of emergency access. No oversized equipment would be used requiring special transport precautions on local streets, roads, or highways. No changes to access points or roadway design would occur with implementation of the IPM Program. Thus, the IPM Program would not increase hazards due to a design feature or incompatible uses. No significant impacts related to transportation would occur from implementation of the IPM Program and this issue is not evaluated further in this ~~Draft~~ PEIR.

3.2 AESTHETICS

This section provides a description of existing visual conditions, meaning the physical features that make up the visible landscape, in the IPM Program Area and provides an assessment of changes to those conditions that would occur from IPM Program implementation. The effects of the IPM Program on the visual environment are generally defined in terms of the IPM Program activities' physical characteristics and potential visibility, the extent to which implementation of the IPM Program would change the perceived visual character and quality of the environment, and the expected level of sensitivity that the viewing public may have where implementation of the IPM Program could alter existing views. The "Analysis Methodology" discussion below provides further detail on the approach used in this evaluation.

There were no comments received on the Notice of Preparation related to aesthetics.

3.2.1 Regulatory Setting

FEDERAL

No federal plans, policies, regulations, or laws related to aesthetics, light, and glare are applicable to the IPM Program.

STATE

California Scenic Highway Program

California's Scenic Highway Program was created by the California Legislature in 1963 and is managed by the California Department of Transportation (Caltrans). The goal of this program is to preserve and protect scenic highway corridors from changes that would affect the aesthetic value of the land adjacent to highways. A highway may be designated "scenic" depending on how much of the natural landscape travelers can see, the scenic quality of the landscape, and the extent to which development intrudes on travelers' enjoyment of the view. Caltrans maintains a list of eligible highways and officially designated scenic highways in California.

LOCAL

Santa Clara County General Plan

The Parks/Recreation and Resource Conservation chapters of the Santa Clara County General Plan (Santa Clara County 1994) provide strategies, policies, and implementation recommendations to protect parks, open space, trails, and scenic highways within the county. The following aesthetic related policies are relevant to the IPM Program:

- **C-PR 37/R-PR 39** The natural scenery along many of Santa Clara County's highways should be protected from land uses and other activities which would diminish its aesthetic beauty.
- **C-PR 39/R-PR 41** The visual integrity of the scenic gateways to the South County (Pacheco Pass, Hecker Pass, Route 101 south of Gilroy, and a Coyote greenbelt area north of Morgan Hill) should be protected.
- **C-RC 1** Natural and heritage resources shall be protected and conserved for their ecological, functional, economic, aesthetic, and recreational values.
- **C-RC 57/R-RC 95** The scenic and aesthetic qualities of both the natural and built environments should be preserved and enhanced for their importance to the overall quality of life for Santa Clara County.

City of Morgan Hill General Plan

The IPM Program Area includes the El Toro preserve which is located within the jurisdiction of the city of Morgan Hill. The Natural Resources and Environment Element of the City of Morgan Hill General Plan (City of Morgan Hill 2017) provides strategies, policies, and implementation recommendations to protect open space, hillsides, and scenic highways within the city. The following aesthetic related policies are relevant to the IPM Program:

- **NRE-1.1 Natural Features.** Preserve outstanding natural features, such as the skyline of a prominent hill and rock outcroppings.
- **NRE-2.2 El Toro Mountain as Landmark Feature.** Retain the City's unique identity by preserving its landmark natural feature, El Toro Mountain.
- **NRE-6.4 Tree Preservation and Protection.** Preserve and protect mature, healthy trees whenever feasible, particularly native trees, historically significant trees, and other trees which are of significant size or of significant aesthetic value to the immediate vicinity or to the community as a whole.

City of San Jose General Plan

The IPM Program Area includes Coyote Ridge, Coyote Valley, Rancho Canada del Oro, Santa Teresa Foothills, and Sierra Vista preserves which are located within the city of San Jose. There are no polices in the Envision San Jose 2040 General Plan pertaining to visual resources that are applicable to the IPM Program (City of San Jose 2018).

3.2.2 Environmental Setting

VIEWER SENSITIVITY

The sensitivity of the viewer, or viewer concern, is based on such factors as: the visibility of resources in the landscape, proximity of the viewers to the visual resource, elevation of the viewers in relation to the visual resource, frequency and duration of views, numbers of viewers, and types and expectations of individuals and viewer groups. Viewer groups are differentiated by physical factors that modify perception. For parks, a distinction can be made between three basic groups, passers-by (motorists and passengers in cars or buses), recreationists (walkers/users of the recreation sites), and residents (those home occupants who can view a park from nearby areas). These groups are further differentiated by the activities they are engaged in. Activities such as commuting or working can distract the observer from the visual environment. On the other hand, activities such as walking, biking, or other forms of recreation can heighten awareness of scenic surroundings. Once overall visual sensitivity is established (based on existing visual quality, viewer exposure, and viewer concern), these factors are then considered together with the level of expected change in basic visual attributes such as form, line, color, and texture.

The primary viewer groups with views of the IPM Program Area include recreationists using public areas of the IPM Program Area preserves or surrounding trails with views of the IPM Program Area, as well as motorists and residents surrounding the IPM Program Area. Coyote Valley, Rancho Canada Del Oro, and Sierra Vista Open Space Preserves are the only preserves in the IPM Program Area that are open to the public at all times. These viewers tend to experience long duration views (high exposure) of the local landscape, because they are likely walking or running at a moderate pace along trails. Also, walkers and nature appreciators often pause at vista points and have high expectations for a scenic experience. Residents also experience long duration views (high exposure) and have high awareness of the visual character and quality of their views because they typically experience the same view for an extended period of time (as long as they live in a residence). Therefore, recreational and residential viewers of the IPM Program Area tend to have high sensitivity to visual quality and change. Motorists tend to experience short duration views when driving along roadways due to the speed they are traveling. Commuting motorists tend to have low to moderate expectations for scenic views because their focus being primarily on the road. In the vicinity of the IPM Program Area, motorists may be touring or recreation-bound travelers and may have moderate to high expectations for scenic views. Therefore, motorists with views of the IPM Program Area have moderate sensitivity to visual quality and change.

REGIONAL VISUAL CHARACTER

The distinctive Santa Clara Valley is bordered by the Santa Cruz Mountains on the west, composed of lush evergreen forests, and the oak chaparral of the Diablo Range to the east. The Santa Clara Valley consists of a combination of dense, compact urban areas surrounded by scenic rural areas and mountain ranges that serve as a scenic backdrop. The Valley's farms and orchards, rolling grasslands and oak savannas, and dramatic ridges that rise abruptly from the Valley floor, give unique definition to the region and help establish its sense of place (Authority 2014:66). The region's visual and scenic resources are further improved by natural rivers and streams, wetlands near the Bay's edge, large expanses of open space and undeveloped areas, and urban parks and architecture of distinction. These resources provide a strong contrast to the expanse of homes, business, and roadways in the urban areas of the county (Santa Clara County 1994:H-40).

VISUAL CHARACTER AND QUALITY OF THE IPM PROGRAM AREA

The IPM Program Area includes 14 of the Authority's open space preserves, all of which are within Santa Clara County. Representative photographs (Viewpoints #1 through #5) of IPM Program Area preserves are shown in Figure 3.2-1. Almost half of the IPM Program Area preserves are located in the Santa Cruz Mountains, including Croy Redwoods, El Toro, Little Uvas Creek, Upper Uvas Creek, and Mount Chual Open Space Preserves, and Rancho Canada del Oro Open Space Preserve is in the Santa Cruz Mountain foothills. Visual character is defined by the visually consistent and appealing rolling hillsides (as shown in Figure 3.2-1, Viewpoint #1) and intermittent peaks of the Santa Cruz Mountain range with varying combinations of large redwood forests, woodlands, chaparral vegetation, grasslands, and water features such as creeks and ponds. Given their protected status as open space preserves, these landscapes are visually intact and unified with minimal urban or humanmade visual intrusions.

Public areas of the preserves (e.g., Rancho Canada del Oro) also provide high quality views of the surrounding landscape, including the Diablo Mountain Range and Mt. Hamilton. Accordingly, these natural landscapes exhibit high visual quality. Of these IPM Program Area preserves in the Santa Cruz Mountains, only the Rancho Canada del Oro Open Space Preserve is currently open to the public; however, docent led hikes are provided at Little Uvas Creek Open Space Preserve. Views of the IPM Program Area preserves within the Santa Cruz Mountains, particularly those that are elevated, are available from surrounding urban areas, roadways, vista points, as well as from within public areas of the preserves themselves. Therefore, viewer groups with potential views of these preserves include residents, motorists, and recreationists.

The Coyote Ridge Open Space Preserve (as shown in Figure 3.2-1, Viewpoint #2), Diablo Foothills Preserve, Sierra Vista Open Space Preserve (as shown in Figure 3.2-1, Viewpoint #3), and Palassou Ridge Preserve are each located in the Diablo Mountain Range. The visual character of these sites consists of rolling hillsides and grasslands which provide colorful and visually appealing wildflowers in the spring. The 5,513-acre Crews Fire burned through the Diablo Foothills Preserve in July 2020 (Midpeninsula Regional Open Space District 2020). Many of the oak trees survived the fire and native grasses are regrowing (Authority 2021). The visual change from the Crews Fire was minimal, and Diablo Foothills Preserve's current visual character consists of the rolling hillsides and grasslands characteristic of the Diablo Mountain Range, similar to that of Coyote Ridge Open Space Preserve and Sierra Vista Open Space Preserve. Given their protected status as open space preserves, these landscapes are visually intact and unified with minimal urban or humanmade visual intrusions. These features, as well as the intact landscape and vistas these preserves provide, result in a high visual quality.

Of the IPM Program Area preserves in the Diablo Mountain Range, only the Sierra Vista Open Space Preserve is currently open to the public; however, docent led hikes are provided at the other preserves. Recreationists have views of these preserves during docent-led hikes and public access weekends, and from select adjacent public parks. Motorists and residents of the surrounding area also experience views of the preserves while traveling roadways or from vantage points within residential and urban areas.

The remaining preserves included in the IPM Program Area are located in the Santa Clara Valley. Coyote Valley Open Space Preserve (as shown in Figure 3.2-1, Viewpoint #4), Santa Teresa Foothills Open Space Preserve, and North Coyote Valley Open Space Preserve are located near San Jose, and the Pajaro River Agricultural Preserve (as shown in Figure 3.2-1, Viewpoint #5) is located in the southern portion of the valley, near Gilroy. The visual character of these preserves is defined by vast valley vistas with backdrops of the surrounding ridgetops. Uninterrupted views of valley floors, linear row crops, meadows with rock outcroppings, and rolling hillsides provide high visual quality. The Coyote Valley Open Space Preserve is open to the public, resulting in high viewership from recreationists. Although closed to the public, the Santa Teresa Foothills Open Space Preserve is in San Jose's urban area and prominent outcroppings result in high visibility from nearby residential neighborhoods. The Pajaro River Agricultural Preserve and the North Coyote Valley Open Space Preserve are visible to motorists travelling on the adjacent roadways and may be visible from vistas in the surrounding mountains.

Source: Photo provided by Santa Clara Valley Open Space Authority in 2019

Viewpoint #1: Rancho Cañada del Oro Open Space Preserve

Source: Photo provided by Santa Clara Valley Open Space Authority in 2019

Viewpoint #2: Coyote Ridge Open Space Preserve as seen from the Valley floor

Source: Photo provided by Santa Clara Valley Open Space Authority in 2019

Viewpoint #3: Sierra Vista Open Space Preserve

Source: Photo provided by Santa Clara Valley Open Space Authority in 2019

Viewpoint #4: Coyote Valley Open Space Preserve

Source: Photo provided by Santa Clara Valley Open Space Authority in 2019

Viewpoint #5: Pajaro River Agricultural Preserve

Figure 3.2-1 Representative Viewpoints

SCENIC HIGHWAYS

Two officially designated state scenic highways, State Route (SR) 35 and SR 9, are located in Santa Clara County. SR 35 is officially designated as it travels south from SR 92, in San Mateo County, through Santa Clara County to the Santa Cruz County line, where it transitions to an eligible state scenic highway until its intersection with SR 17. SR 9 is an officially designated state scenic highway as it travels east from the Santa Cruz county line to the Los Gatos city line, where it transitions to an eligible state scenic highway until its intersection with SR 17 (Caltrans 2017). No existing IPM Program Area preserves are visible from the designated scenic portions of SR 35 and SR 9 due to the distance from the preserves, the steep topography of the Santa Cruz Mountains, and thick vegetation.

Several additional highways eligible for scenic highway designation are located in the vicinity of IPM Program Area preserves, and several Santa Clara County designated scenic routes travel within or in close proximity to IPM Program Area preserves.

LIGHT AND GLARE CONDITIONS

Existing sources of light and glare in the vicinity of the IPM Program area include street lighting, cars (e.g., headlights and reflective surfaces), and nearby residential areas (e.g., lighting and reflective surfaces). However, the majority of the IPM Program Area preserves are in rural, undeveloped portions of the county and overall, adjacent light and glare is minimal in the IPM Program Area.

The IPM Program Area preserves are only open during daylight hours and no lighting is provided within the IPM Program Area. Although mostly undeveloped, there are structures made with reflective surfaces such as glass and metal present in the IPM Program Area; and equipment and vehicles are currently used in the IPM Program Area. Accordingly, some daytime glare may be produced intermittingly in portions of the IPM Program Area.

3.2.3 Environmental Impacts and Mitigation Measures

METHODOLOGY

The aesthetics and visual resource impact analysis is based on an evaluation of the potential changes to existing visual character and quality of the IPM Program Area as a result of IPM Program implementation. To determine the existing visual quality of the IPM Program Area (described above), consideration was given to:

- the visual features or resources that comprise and define the visual character of the viewshed (i.e., the physiographic area composed of land, water, biotic, and cultural elements that may be visible and that has inherent scenic qualities and/or aesthetic values as determined by those who view it.);
- the overall visual character and quality of the IPM Program Area as defined by the identified visual features or resources;
- primary viewer groups and relative viewer exposure; and
- viewer sensitivity, or the relative importance of views to people who are members of the viewing public.

A substantial adverse effect would occur if viewers with high levels of overall visual sensitivity (i.e., high viewer concern and visual exposure, in settings of high existing visual quality) encounter diminished scenic quality, substantial visual change, or scenic view obstruction as a result of the IPM Program.

THRESHOLDS OF SIGNIFICANCE

An impact to aesthetics and visual resources is considered significant if implementation of the IPM Program would do any of the following:

- have a substantial adverse effect on a scenic vista;

- damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway;
- substantially degrade the existing visual character or quality of public views of the site and its surroundings;
- create a new source of substantial light or glare which would adversely affect day or nighttime views in the area.

ISSUES NOT DISCUSSED FURTHER

Although two officially designated state scenic highways are located in the vicinity of the IPM Program in Santa Clara County, they do not provide views of the IPM Program Area because of distance, intervening topography, and thick vegetation. Implementation of the IPM Program would not damage scenic resources within a state scenic highway, or substantially alter views from a state scenic highway. This topic is not discussed further.

The IPM Program would not result in the construction or installation of new buildings, lighting facilities, or other potential sources of light and glare. Although vehicles and equipment would be present within IPM Program Area preserves during IPM treatments, Authority vehicles and equipment are already in use throughout the IPM Program Area and no substantial change would occur resulting in new sources of potential glare. Furthermore, IPM Program activities would only occur during daytime hours and no nighttime lighting would be required. No substantial sources of new light or glare would occur with implementation of the IPM Program and this topic is not discussed further.

ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

Impact 3.2-1: Potential to Adversely Affect Scenic Vistas or Substantially Degrade the Existing Visual Character or Quality of Public Views

IPM Program treatment activities would consist of manual, mechanical, and chemical treatments targeted for select sites within the IPM Program Area, including structures and buildings, recreational facilities, agricultural lands, and natural lands. Treatments could result in temporary effects to visual quality by the presence of trapping devices, tenting and fumigating buildings and structures, and mechanical equipment in the IPM Program Area. However, IPM treatments would be temporary and short-term, would help re-establish native vegetation patterns, and would not dominate long range or panoramic views. IPM Program treatments would not result in adverse effects on scenic vistas or substantially degrade the visual character or quality of the site and its surrounding. Therefore, this impact would be **less than significant**.

The IPM Program includes manual, mechanical, and chemical treatments at open space preserves owned and maintained by the Authority. As shown in Table 2-2 in Chapter 2, "Program Description," different combinations of IPM treatment activities would be applied according to the following IPM management categories: structures and buildings, recreational areas, agricultural lands, and natural lands. Each IPM management category and IPM treatment activity have varying levels of potential public visibility, which are evaluated by management category in detail below.

<u>Structures and Buildings</u>

Structures and buildings within the IPM Program Area include an administrative office, barns, one habited house, uninhabited houses, and sheds. Manual, mechanical, and chemical treatments are proposed in structures and buildings within the IPM Program Area, which include prevention and sanitation (e.g., picking up trash); habitat modifications, such as removing brush piles, covering building entry points, and ~~destroying~~ <u>removing</u> old <u>rodent</u> burrows using a small tractor; use of baited insecticides and in cases when human health is at risk, rodenticides; animal trapping using sticky, electric, box, or cage traps; and tenting buildings/structures to fumigate structural pests. IPM treatments in structures and buildings would be site-specific, resulting in no visible long-term change to structures, and no substantial changes to the landscape surrounding buildings would occur. Therefore, the treatments would not adversely affect long-range views, such as from a scenic vista or from residences surrounding a preserve. The primary viewer group that could notice visual changes as a result of IPM treatments in structures and buildings would be recreational visitors in public areas of the IPM Program Area in the immediate vicinity of a structure or building undergoing outdoor treatment or termite fumigation. As previously described, recreationists typically have high sensitivity to visual changes. Of the manual and chemical activities proposed in buildings and structures, only the use of equipment or large trapping devices and tenting used during termite fumigation would be visible to recreators in the short-term, which would conflict with the natural setting of IPM Program Area preserves. However, the use of equipment, large traps, and tenting for termite fumigation would be site-specific and temporary, typically lasting up to one week at each treatment site for activities requiring mechanical equipment and traps, and up to three days for termite fumigation tenting, and would only be visible when occurring in publicly accessible portions of the three IPM Program Area preserves. In addition, the Authority currently uses vehicles and equipment within the IPM Program Area; implementation of the IPM Program would not significantly increase the quantity or visibility of equipment or vehicles in the IPM Program Area. In the long-term, prevention and sanitation, habitat modifications, use of baited insecticides and rodenticides, animal trapping, and tenting for termite fumigation would not significantly change the visual character or quality of the landscape. Therefore, substantial degradation to the existing visual character or quality of public views would not occur as a result of IPM Program treatments to structures and buildings.

Recreational Areas

Recreational areas consist of trails, picnic areas, and associated amenities such as parking lots, roads, bridges, gates, and bathrooms, which are all typically open to the public. Manual, mechanical, and chemical treatments are proposed to manage and control nuisance pests and vegetation within recreational areas and vegetative rights-of-way. Manual treatments would include prevention and sanitation, such as the removal of trash; digging and clearing with the use of hand tools for fire risk reduction near utilities; habitat modification, such as removal of rock, brush piles and nests to control stinging insects, mosquitos, rattlesnakes, and other stray wildlife and pests; and wildlife trapping using a variety of methods including cage traps. Mechanical treatments would include mowing, cutting, and limbing using weed whips, tractor operated mowers, chainsaws, chippers, and other similar mechanical equipment. Chemical treatments would only be used when necessary, such as permanent treatment for perennial plants (i.e. poison oak) or when determined to be the only viable treatment option to address human health and safety concerns.

Recreational areas experience the highest levels of public use, and therefore, have high viewer sensitivity. Treatment activities requiring the use of large equipment or traps could be visible to recreationists when occurring within public access areas. Mechanical equipment and traps would contrast with the natural landscape and would temporarily disrupt the natural character and visual quality of the preserves. However, these activities and the presence of equipment would be short-term, typically lasting up to one week at each treatment site, and would not dominate a view because they would be limited small areas. In addition, the Authority currently uses vehicles and equipment within recreational areas of the IPM Program Area; implementation of the IPM Program would not significantly increase the quantity or visibility of equipment or vehicles. In the long-term, removal of nuisance and invasive vegetation could improve the overall visual quality of recreational areas by improving habitat conditions, allowing native vegetation to re-establish, or opening up viewsheds from removal of nuisance vegetation. Treatment activities would not be visibly dominant in long-range views from scenic vistas or surrounding residences and would not change the long-term visual character or quality of the IPM Program Area. Therefore, substantial degradation to the existing visual character or quality of public views would not occur as a result of IPM Program treatments to recreational areas.

Agricultural Lands

The IPM Program Area currently includes one active agricultural preserve with row crops, the Pajaro River Agricultural Preserve, and the North Coyote Valley Preserve has been previously cultivated and used for agricultural uses. The IPM Program proposes manual and mechanical treatments to cultivate soils and manage pests to maintain specific agricultural land uses while providing natural resource protection and visitor access. Manual treatments would include pulling, mulching, hoeing, and weedmats to remove invasive plants through the use of hand tools, and in some cases, live trapping rodents. Mechanical treatments would include mowing, cutting, cultivation, discing, ~~and~~ green flaming, and rodent burrow ~~destruction~~ removal and would require mechanical equipment such as mowers and tractors. Agriculture preserves are not open to the public for recreation access; therefore, viewers would primarily include motorists using adjacent roadways. Agricultural equipment is already in use in agricultural preserves, and its presence would be temporary and consistent with the agricultural character of the preserve. In the long-term, the visual character and quality agricultural preserves would not change substantially as row crop production and other agricultural uses would continue, as shown in Figure 3.2-1 Viewpoint #5. Therefore, substantial degradation to the existing visual character or quality of public views would not occur as a result of IPM Program treatments to agricultural lands.

Natural Lands

Natural areas make up the majority of Authority lands, and typically experience minimal levels of human use, aside from designated recreation areas located within the three preserves that are open to the public. Manual, mechanical, and chemical treatment options are proposed to control invasive plant and animal populations and to preserve and restore natural resources. Manual and mechanical treatment options to control invasive plants include pulling, digging, scraping, cutting/mowing, weed whipping, brush cutting, girdling/frilling/drilling, and green flaming. Manual treatment options to control invasive animals include habitat modification, trapping, physical barriers, gigging/shooting, and electrical currents. Chemical treatment options include herbicide applications to control invasive plants. Although natural lands experience minimal levels of human use, these areas may be visible from surroundings areas, including scenic vistas. The presence of large equipment would contrast with the natural landscape and would temporarily disrupt the natural character and visual quality of the preserves. However, IPM activities and the presence of equipment would be short-term, typically lasting up to one week at each treatment project site, and would not dominate a viewshed because they would be limited to small areas and primarily only be visible from long range, panoramic views. In addition, the Authority currently uses vehicles and equipment within natural lands in the IPM Program Area; implementation of the IPM Program would not significantly increase the quantity or visibility of equipment or vehicles. In the long-term, removal of invasive vegetation could improve the overall visual quality of natural lands by improving habitat conditions and allowing native vegetation to re-establish. Therefore, substantial degradation to the existing visual character or quality of public views would not occur as a result of IPM Program treatments to natural lands.

Summary

IPM treatment activities would require the use of equipment and vehicles which would be visible to recreationists, motorists, and residents depending on the location of the treatment project site. However, IPM treatments would be site-specific and temporary, and would use the same types of equipment as are currently used in the IPM Program. IPM treatment activities would preserve natural resources, improve public access, and would help to re-establish native vegetation patterns. Therefore, treatment activities proposed under the IPM Program are expected to provide long-term benefits to the visual character and quality of the IPM Program Area. Because the IPM program would not result in adverse effects on scenic vistas or substantially degrade the visual character or quality of public views of the site and its surroundings, this impact would be **less than significant**.

3.3 BIOLOGICAL RESOURCES

This section identifies common and sensitive biological resources that could be present in the IPM Program Area and evaluates the potential for adverse effects as a result of IPM Program implementation. This evaluation is based on a review of biological resources within the IPM Program Area through interpretation of aerial photographs, assembly of vegetation data, and searches of the California Department of Fish and Wildlife (CDFW) California Natural Diversity Database (CNDDB) and other relevant databases and documents.

Public comments on the Notice of Preparation related to biological resources included concerns about potential impacts to aquatic resources and inquiries regarding what types of permits would be required. Comments also suggested that IPM Program activities should be planned to avoid bird nesting and migration seasons. Potential impacts to aquatic resources are addressed under Impact 3.3-3 and Impact 3.3-4 and potential impacts on nesting and migrating birds are addressed under Impact 3.3-2. The thresholds of significance used for the analysis of potential impacts to aquatic resources and nesting birds are provided in Section 3.3.3, "Environmental Impacts and Mitigation Measures."

3.3.1 Regulatory Setting

FEDERAL

Federal Endangered Species Act

Pursuant to the federal Endangered Species Act (ESA) (16 U.S.C. Section 1531 et seq.), the U.S. Fish and Wildlife Service (USFWS) and the National Oceanic and Atmospheric Administration's National Marine Fisheries Service (NMFS) regulate the taking of species listed in the ESA as threatened or endangered. In general, persons subject to ESA (including private parties) are prohibited from "taking" endangered or threatened fish and wildlife species on private property, and from "taking" endangered or threatened plants in areas under federal jurisdiction or in violation of state law. Under Section 9 of the ESA, the definition of "take" is to "harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct." USFWS has also interpreted the definition of "harm" to include significant habitat modification that could result in take.

Two sections of the ESA address incidental take. Section 10 regulates incidental take if a non-federal agency is the lead agency for an action that results in take and no other federal agencies are involved in permitting the action. However, if a project would result in take of a federally-listed species and federal discretionary action (even if a non-federal agency is the overall lead agency) is involved (i.e., a federal agency must issue a permit), the involved federal agency consults with USFWS or NMFS under Section 7 of the ESA.

Clean Water Act

Section 404 of the Clean Water Act (CWA) requires project proponents to obtain a permit from the U.S. Army Corps of Engineers (USACE) before performing any activity that involves any discharge of dredged or fill material into waters of the United States, including wetlands. Waters of the United States include navigable waters of the United States, interstate waters, tidally influenced waters, and all other waters where the use, degradation, or destruction of the waters could affect interstate or foreign commerce, tributaries to any of these waters, and wetlands that meet any of these criteria or that are adjacent to any of these waters or their tributaries. Many surface waters and wetlands in California meet the criteria for waters of the United States.

In accordance with Section 401 of the CWA, projects that apply for a USACE permit for discharge of dredged or fill material must obtain water quality certification from the appropriate regional water quality control board (RWQCB) indicating that the action would uphold state water quality standards. The San Francisco Bay and Central Coast RWQCBs have jurisdiction over the IPM Program Area.

Bald and Golden Eagle Protection Act

Under the Bald and Golden Eagle Protection Act, it is illegal to take bald or golden eagles, including their parts, nests, or eggs unless authorized. "Take" is defined as "pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest or disturb." Disturb means to agitate or bother a bald or golden eagle to a degree that causes, or is likely to cause (1) injury to an eagle; (2) a decrease in its productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior; or (3) nest abandonment. In addition to immediate impacts, this definition also addresses impacts that result from human-induced alterations initiated around a previously used nest site during a time when eagles are not present, if, upon the eagle's return, such alterations agitate or bother an eagle to a degree that interferes with or interrupts normal breeding, feeding, or sheltering habits, and causes injury, death, or nest abandonment.

Migratory Bird Treaty Act

The Migratory Bird Treaty Act (MBTA), first enacted in 1918, provides for protection of international migratory birds and authorizes the Secretary of the Interior to regulate the taking of migratory birds. The MBTA provides that it is unlawful, except as permitted by regulations, to pursue, take, or kill any migratory bird, or any part, nest, or egg of any such bird. Under the MBTA, "take" is defined as "to pursue, hunt, shoot, wound, kill, trap, capture, or collect, or any attempt to carry out these activities." A take does not include habitat destruction or alteration, as long as there is not a direct taking of birds, nests, eggs, or parts thereof. The current list of species protected by the MBTA can be found in Title 50 of the Code of Federal Regulations (CFR), Section 10.13 (50 CFR 10.13). The list includes nearly all birds native to the United States.

STATE

California Endangered Species Act

Pursuant to the California Endangered Species Act (CESA), a permit from CDFW is required for projects that could result in the "take" of a plant or animal species that is listed by the state as threatened or endangered. Under CESA, "take" is defined as an activity that would directly or indirectly kill an individual of a species, but does not include "harm" or "harass," as does the federal definition. As a result, the threshold for take is higher under CESA than under the federal ESA. Authorization for take of state-listed species can be obtained through a California Fish and Game Code Section 2081 incidental take permit.

California Fish and Game Code Sections 3503 and 3503.5—Protection of Bird Nests and Raptors

Section 3503 of the Fish and Game Code states that it is unlawful to take, possess, or needlessly destroy the nest or eggs of any bird. Section 3503.5 of the California Fish and Game Code states that it is unlawful to take, possess, or destroy any raptors (i.e., species in the orders *Falconiformes* and *Strigiformes*), including their nests or eggs. Typical violations include destruction of active nests as a result of tree removal or disturbance caused by project construction or other activities that cause the adults to abandon the nest, resulting in loss of eggs and/or young.

Fully Protected Species under the California Fish and Game Code

Protection of fully protected species is described in Sections 3511, 4700, 5050, and 5515 of the California Fish and Game Code. These statutes prohibit take or possession of fully protected species and do not provide for authorization of incidental take.

Native Plant Protection Act

The Native Plant Protection Act (NPPA) (California Fish and Game Code Section 1900 et seq.) allows the California Fish and Game Commission to designate plants as rare or endangered. Sixty-four species, subspecies, and varieties of plants are protected as rare under the NPPA. The act prohibits take of endangered or rare native plants but includes exceptions for agricultural and nursery operations; for emergencies; and, after proper notification of CDFW, for vegetation removal from canals, roads, and other building sites, changes in land use, and other situations.

Porter-Cologne Water Quality Control Act

The Porter-Cologne Act requires that each of the nine RWQCBs prepare and periodically update basin plans for water quality control. Each basin plan sets forth water quality standards for surface water and groundwater and actions to control nonpoint and point sources of pollution to achieve and maintain these standards. Basin plans offer an opportunity to protect wetlands through the establishment of water quality objectives. The RWQCB's jurisdiction includes waters of the United States, as well as areas that meet the definition of "waters of the state." "Waters of the state" is defined as any surface water or groundwater, including saline waters, within the boundaries of the state. The RWQCB has the discretion to take jurisdiction over areas not federally protected under CWA Section 404 provided they meet the definition of waters of the state and the State Water Resources Control Board published a new set of procedures for discharges of dredged or fill material into waters of the state on March 22, 2019. Mitigation requiring no net loss of wetlands functions and values of waters of the state typically is required by the RWQCB.

The State Water Resources Control Board has adopted the following definition of wetlands:

> *An area is wetland if, under normal circumstances, (1) the area has continuous or recurrent saturation of the upper substrate caused by groundwater or shallow surface water or both; (2) the duration of such saturation is sufficient to cause anaerobic conditions in the upper substrate; and (3) the area's vegetation is dominated by hydrophytes the area lacks vegetation.*

California Fish and Game Code Section 1602—Streambed Alteration

All diversions, obstructions, or changes to the natural flow or bed, channel, or bank of any river, stream, or lake in California that supports wildlife resources are subject to regulation by CDFW under Section 1602 of the California Fish and Game Code. Under Section 1602, it is unlawful for any person, governmental agency, or public utility to do the following without first notifying CDFW:

- substantially divert or obstruct the natural flow of, or substantially change or use any material from, the bed, channel, or bank of any river, stream, or lake; or
- deposit or dispose of debris, waste, or other material containing crumbled, flaked, or ground pavement where it may pass into any river, stream, or lake.

The regulatory definition of a stream is a body of water that flows at least periodically or intermittently through a bed or channel that has banks and supports fish or other aquatic life. This definition includes watercourses with a surface or subsurface flow that supports or has supported riparian vegetation. CDFW's regulatory authority within altered or artificial waterways is based on the value of those waterways to fish and wildlife. A CDFW streambed alteration agreement must be obtained for any action that would result in an impact on a river, stream, or lake.

LOCAL

Santa Clara County General Plan

The following biological resource related policies from the Resource Conservation Chapter of the Santa Clara County General Plan (Santa Clara County 1994) are relevant to the proposed IPM Program:

- **R-RC 14:** Use and disposal of agricultural chemicals, such as fertilizers, pesticides and herbicides, shall be managed to minimize the threat of water pollution.
- **R-RC 19:** Habitat types and biodiversity within Santa Clara County and the region should be maintained and enhanced for their ecological, functional, aesthetic, educational, medicinal, and recreational importance.
- **R-RC 31:** Natural streams, riparian areas, and freshwater marshes shall be left in their natural state providing for percolation and water quality, fisheries, wildlife habitat, aesthetic relief, and educational or recreational uses that are environmentally compatible. Streams which may still provide spawning areas for anadromous fish species should be protected from pollution and development impacts which would degrade the quality of the stream environment.

- **R-RC 32:** Riparian and freshwater habitats shall be protected through the following general means:
  a. setback of development from the top of the bank;
  b. regulation of tree and vegetation removal;
  c. reducing or eliminating use of herbicides, pesticides, and fertilizers by public agencies;
  d. control and design of grading, road construction, and bridges to minimize environmental impacts and avoid alteration of the streambed and stream banks (freespan bridges and arch culverts, for example); and
  e. protection of endemic, native vegetation.

Santa Clara Valley Habitat Plan

The Santa Clara Valley Habitat Plan (Habitat Plan) is a habitat conservation plan and natural community conservation plan that provides incidental take coverage under ESA and CESA for several listed species for certain covered activities within the geographic scope of the Habitat Plan. The geographic scope of the Habitat Plan incorporates a large portion of Santa Clara County and contains the majority of the IPM Program Area. Species covered by the Habitat Plan include species listed as threatened and endangered under the ESA and CESA, as well as other special-status species (Table 3.3-1). Covered activities include enhancement of habitat, eradication of invasive plant and animal species, and integrated pest management projects. The use of herbicides and rodenticides is a covered activity for non-listed species and CESA-listed species, but is not a covered activity for ESA-listed species. Therefore, the Habitat Plan does not provide for take coverage for federally listed species from the use of pesticides. The Authority may seek take coverage under the Habitat Plan for all IPM Program treatment activities that could result in take of CESA listed species, and for non-pesticide activities that could result in take of ESA listed species (Santa Clara County et al. 2012).

Table 3.3-1 Santa Clara Valley Habitat Plan Covered Species

Covered Plants	Federal Status	State Status	Other Status
Tiburon paintbrush (*Castilleja affinis* var. *neglecta*)	Endangered	Threatened	CRPR - 1B.2
Coyote ceanothus (*Ceanothus ferrisiae*)	Endangered	—	CRPR - 1B.1
Mount Hamilton thistle (*Cirsium fontinale* var. *campylon*)	—	—	CRPR - 1B.2
Santa Clara Valley dudleya (*Dudleya abramsii* ssp. *Setchellii*)	Endangered	—	CRPR - 1B.1
fragrant fritillary (*Fritillaria liliacea*)	—	—	CRPR - 1B.2
Loma Prieta hoita (*Hoita strobilina*)	—	—	CRPR - 1B.1
smooth lessingia (*Lessingia micradenia* var. *glabrata*)	—	—	CRPR - 1B.2
Metcalf Canyon jewelflower (*Streptanthus albidus* ssp. *albidus*)	Endangered	—	CRPR - 1B.1
most beautiful jewelflower (*Streptanthus albidus* ssp. *peramoenus*)	—	—	CRPR - 1B.2
Covered Wildlife			
Bay checkerspot butterfly (*Euphydryas editha bayensis*)	Threatened	—	—
California tiger-salamander (*Ambystoma californiense*)	Threatened	Threatened	—
California red-legged frog (*Rana draytonii*)	Threatened	Species of Special Concern	—

Covered Plants	Federal Status	State Status	Other Status
foothill yellow-legged frog (*Rana boylii*)	—	Candidate Endangered	—
western Pond turtle (*Actinemys marmorata*)	—	Species of Special Concern	—
western burrowing owl (*Athene cunicularia*)	—	Species of Special Concern	—
least Bell's vireo (*Vireo bellii pusillus*)	Endangered	Endangered	—
tri-colored blackbird (*Agelaius tricolor*)	—	Threatened	—
San Joaquin kit fox (*Vulpes macrotis mutica*)	Endangered	Threatened	—

Note: CRPR = California Rare Plan Rank

California Rare Plant Ranks:

1B Plant species considered rare or endangered in California and elsewhere (protected under CEQA, but not legally protected under ESA or CESA)

2 Plant species considered rare or endangered in California but more common elsewhere (protected under CEQA, but not legally protected under ESA or CESA)

Threat Ranks

0.1-Seriously threatened in California (over 80% of occurrences threatened / high degree and immediacy of threat)

0.2-Moderately threatened in California (20-80% occurrences threatened / moderate degree and immediacy of threat)

Source: Santa Clara County et al. 2012

City of Morgan Hill General Plan

The following goals and policies related to biological resources from the City of Morgan Hill General Plan (City of Morgan Hill 2017) are relevant to the proposed IPM Program:

GOAL NRE-6 Protection of native plants, animals, and sensitive habitats.

- **Policy NRE-6.2 Habitat Conservation Plan.** Support the implementation of the Santa Clara Valley Habitat Plan to protect wildlife, rare and endangered plants and animals, and sensitive habitats from loss and destruction.
- **Policy NRE-6.4 Tree Preservation and Protection.** Preserve and protect mature, healthy trees whenever feasible, particularly native trees, historically significant trees, and other trees which are of significant size or of significant aesthetic value to the immediate vicinity or to the community as a whole.

City of San Jose General Plan

The following biological resource goals and policies from the Envision San Jose 2040 General Plan (City of San Jose 2018) are relevant to the proposed IPM Program:

GOAL ER-1-Grassland, Oak Woodlands, Chaparral and Coast Scrub. Preserve, protect and restore the ecological integrity and scenic characteristics of grasslands, oak woodlands, chaparral and coastal scrub in hillside areas.

- **Policy ER-1.3** Cooperate with other agencies in the preservation and management of native hillside vegetation.
- **Policy ER-1.5** Preserve and protect oak woodlands, and individual oak trees. Any loss of oak woodland and/or native oak trees must be fully mitigated.
- **Policy ER-1.6** Preserve, protect, and manage serpentine grasslands and serpentine chaparral, particularly those supporting sensitive serpentine bunchgrass communities providing habitat for sensitive plant and animal species. Development will not be permitted on serpentine grasslands or chaparral supporting state or federal candidate or listed threatened or endangered plant or animal species. Appropriately managed grazing is encouraged on serpentine grasslands.

GOAL ER-2-Riparian Corridors. Preserve, protect, and restore the City's riparian resources in an environmentally responsible manner to protect them for habitat value and recreational purposes.

- **Policy ER-2.2** Ensure that a 100-foot setback from riparian habitat is the standard to be achieved in all but a limited number of instances, only where no significant environmental impacts would occur.
- **Policy ER-2.5** Restore riparian habitat through native plant restoration and removal of nonnative/invasive plants along riparian corridors and adjacent areas.

GOAL ER-4-Special-Status Plants and Animals. Preserve, manage, and restore habitat suitable for special-status species, including threatened and endangered species.

- **Policy ER-4.1** Preserve and restore, to the greatest extent feasible, habitat areas that support special-status species. Avoid development in such habitats unless no feasible alternatives exist and mitigation is provided of equivalent value.
- **Policy ER-4.3** Prohibit planting of invasive non-native plant species in natural habitats that support special-status species.

GOAL ER-5-Migratory Birds. Protect migratory birds from injury or mortality.

- **Policy ER-5.1** Avoid implementing activities that result in the loss of active native birds' nests, including both direct loss and indirect loss through abandonment, of native birds. Avoidance of activities that could result in impacts to nests during the breeding season or maintenance of buffers between such activities and active nests would avoid such impacts.

3.3.2 Environmental Setting

The IPM Program Area is located in central and southern Santa Clara County. The area extends from the crest of the Santa Cruz Mountains in the west to the Diablo Range in the east, and from Alum Rock Creek in the north to the San Benito County line in the south. The preserves within the IPM Program Area contain a wide variety of habitat types, including redwood forest, oak woodlands, serpentine grasslands, and agricultural fields, which are described in detail below. Information on surface waters within the IPM Program Area is provided in Section 3.5, Hydrology and Water Quality."

LAND COVER AND COMMON WILDLIFE

The land cover types and acreages within the IPM Program Area are shown in Table 3.3-2. This information is based on the boundaries of Authority managed preserves within the IPM Program Area and vegetation data provided by the Authority.

Table 3.3-2 Land Cover Types in the IPM Program Area

Land Cover Type	Area of Land Cover Type (acres)
Barren/Rock	8
Blue Oak- Foothill Pine Woodland	124
Blue Oak Forest / Woodland	555
California Bay Forest	1,383
Central Coast Riparian Forests	97
Chamise Chaparral	1,762
Coast Live Oak Forest / Woodland	3,771
Coastal Scrub	186
Cultivated	490
Douglas Fir Forest	18

Land Cover Type	Area of Land Cover Type (acres)
Hot Grasslands	24
Mixed Montane Chaparral	451
Moderate Grasslands	774
Montane Hardwoods	1,115
Redwood Forest	203
Rural Residential	48
Semi-Desert Scrub / Desert Scrub	672
Serpentine Grassland	1,532
Serpentine Hardwoods	395
Serpentine Leather-Oak Chaparral	30
Serpentine Riparian	13
Serpentine Scrub	46
Urban	11
Valley Oak Forest / Woodland	38
Warm Grasslands	2,689
Water	1

Note: Acreages are rounded to the nearest whole number

Source: Compiled by Ascent 2021

As shown in Table 3.3-2, the IPM Program Area preserves are primarily made up of forests, woodlands, grasslands, and chaparral. Accordingly, the preserves within the IPM Program contain habitat for many common wildlife species. Common birds that may be present within the IPM Program Area include California quail (*Callipepla californica*), California scrub-jay (*Aphelocoma californica*), white-crowned sparrow (*Zonotrichia leucophry*), dark-eyed junco (*Junco hyemalis*), and red-tailed hawk (*Buteo jamaicensis*). Many common amphibians and reptiles may be found within the IPM Program Area, including pacific gophersnake (*Pituophis catenifer catenifer*), coast range fence lizard (*Sceloporus occidentalis bocourtii*), California slender salamander (*Batrachoseps attenuates*), and sierran treefrog (*Pseudacris sierra*). Mammals that commonly occur within the IPM Program Area include mule deer (*Odocoileus hemionus*), coyote (*Canis latrans*), and striped skunk (*Mephitis mephitis*).

SENSITIVE BIOLOGICAL RESOURCES

Special-Status Species

Special-status species are legally protected or otherwise considered sensitive by federal, state, or local resource agencies. Special-status species are species, subspecies, or varieties that fall into one or more of the following categories, regardless of their legal or protection status:

- species listed or proposed for listing as threatened or endangered under ESA (50 CFR 17.12 for listed plants, 50 CFR 17.11 for listed animals, and various notices in the Federal Register for proposed species) or candidates for possible future listing as threatened or endangered under ESA (75 CFR 69222);
- species listed or candidates for listing by the State of California as threatened or endangered under CESA (14 CCR Section 670.5);
- species identified by CDFW as Species of Special Concern;
- species listed as Fully Protected under the California Fish and Game Code (FGC) (Section 3511 for birds, Section 4700 for mammals, Section 5050 for reptiles and amphibians, and Section 5515 for fish);

- plants listed as rare under the California Native Plant Protection Act (FGC Section 1900 et seq.);
- species ranked by the Western Bat Working Group as ‘high’ or ‘medium’ on the Regional Priority Matrix;
- species afforded protection under local or regional plans, policies, or ordinances;
- plants considered by CDFW to be “rare, threatened or endangered in California” (California Rare Plant Ranks of 1A, presumed extinct in California and either rare or extinct elsewhere; 1B, considered rare or endangered in California and elsewhere; 2A, presumed extinct in California but common elsewhere; and 2B, considered rare or endangered in California but more common elsewhere). Note that while these rankings do not afford the same type of legal protection as ESA or CESA, the uniqueness of these species requires special consideration under Section 15380 of the State CEQA Guidelines (14 CCR Section 15000 et seq.); or
- taxa (i.e., taxonomic category or group) that otherwise meet the definition of rare or endangered under Section 15380 of the State CEQA Guidelines (14 CCR Section 15000 et seq.).

The term “California species of special concern” is applied by CDFW to animals not listed under ESA or CESA, but that are declining at a rate that could result in listing, or that historically occurred in low numbers and known threats to their persistence currently exist. CDFW’s fully protected status was California’s first attempt to identify and protect animals that were rare or facing extinction. Most species listed as fully protected were eventually listed as threatened or endangered under CESA; however, some species remain listed as fully protected but do not have simultaneous listing under CESA. Fully protected species may not be taken or possessed at any time and no take permits can be issued for these species except for scientific research purposes or for relocation to protect livestock.

Based on a review of the CNPS Inventory of Rare and Endangered Plants and CDFW’s CNDDB, there are 44 special-status botanical species, three special status invertebrates, four special-status fish, 10 special-status amphibians and reptiles, 13 special-status birds, and nine special-status mammals that are known to occur or could occur in the IPM Program Area (CNDDB 2021 and CNPS 2021). Refer to Appendix C for the full list of special-status species known to occur within the IPM Program Area region and the potential for each species to occur within the IPM Program Area.

Sensitive Natural Communities

Sensitive natural communities include those that are of special concern to resource agencies or are afforded specific consideration through CEQA or other federal or state laws. Sensitive natural communities may be of special concern to regulatory agencies and conservation organizations for a variety of reasons, including their locally or regionally declining status, or because they provide important habitat to common and special-status species. Many of these communities are tracked in CDFW’s CNDDB. Sensitive natural communities known to occur within the IPM Program Area are shown in Table 3.3-3.

Table 3.3-3 Sensitive Natural Communities within the IPM Program Area

Sensitive Communities	Acres within IPM Program Area
Coastal Scrub	186
Valley Oak Forest / Woodland	38
Central Coast Riparian Forests	97
Serpentine Grassland	1,532
Serpentine Scrub	46
Serpentine Leather-Oak Chaparral	30
Serpentine Hardwoods	395
Serpentine Riparian	13
Total	**2,337**

Note: Acreages are rounded to the nearest whole number

Source: Data compiled by Ascent 2021

Critical Habitat

Critical habitat for an endangered or threatened species is made up of specific areas that contain features essential to the conservation of the species and that may require special management and protection. Critical Habitat exists within and adjacent to the IPM Program Area for the following species: Bay checkerspot butterfly (*Euphydryas editha bayensis*), Central California Coast Steelhead Distinct Population Segment (DPS) (*Oncorhynchus mykiss irideus*), South Central California Coast Steelhead DPS (*O. mykiss irideus*), California red-legged frog (*Rana draytonii*), and California tiger salamander (*Ambystoma californiense*) (USFWS 2019; NOAA 2019a; NOAA 2019b).

3.3.3 Environmental Impacts and Mitigation Measures

METHODOLOGY

Evaluation of potential biological resource impacts is based on review of aerial photographs, vegetation data, relevant databases including CNPS and CNDDB, the Santa Clara Valley Habitat Plan (Santa Clara County et al. 2012), and other relevant documents. In determining the level of significance of impacts, the analysis assumes that the IPM Program would comply with relevant federal, state, and local laws, ordinances, and regulations and accounts for the influence of relevant EPMs, which are incorporated into IPM treatment design.

THRESHOLDS OF SIGNIFICANCE

An impact on biological resources is considered significant if implementation of the IPM Program would do any of the following:

- have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special-status species in local or regional plans, policies, or regulations, or by CDFW or USFWS;
- have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, or regulations or by CDFW or USFWS;
- have a substantial adverse effect on state or federally protected wetlands (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means;
- interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites;
- conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance; and/or
- conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan.

ISSUES NOT DISCUSSED FURTHER

Wildlife Movement

The treatment methods that would be applied to implement the IPM Program (i.e., manual treatments, mechanical treatments, chemical treatments) would not modify or remove habitats within the IPM Program Area to the extent that these habitats would be unsuitable for use for the movement by wildlife or use as nursery sites. In addition, the IPM Program does not include the construction of any permanent barriers that could obstruct wildlife movement. Accordingly, there would not be a substantial adverse effect on the movement of resident or migratory species though the IPM Program Area or impediment of the use of native wildlife nursery sites. Therefore, this issue is not discussed further in this PEIR.

ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

Impact 3.3-1: Potential to Substantially Affect Special-Status Plants

Implementation of the IPM Program on agricultural lands and within structures and buildings would not result in any adverse effects on special-status plants due a lack of suitable habitat in those areas. Implementation of the IPM Program in the vicinity of structures and buildings for ground squirrel control and on recreation facilities and natural lands has the potential to result in adverse effects on special-status plants if present; however, implementation of EPMs would avoid and minimize impacts to special-status plants through pre-treatment surveys and avoidance buffers around identified special-status plants. Therefore, the impact would be **less than significant**.

There are 44 special-status plants that could occur or are known to occur within the IPM Program Area (Appendix C, "Special-Status Species"). Although, the removal of invasive plants may benefit special-status plants in the long term by removing competition with these species, the IPM Program would implement manual, mechanical, and chemical treatments within IPM Program Area preserves, which could result in adverse effects on special-status plants if present within IPM treatment areas.

<u>Agricultural Lands, Structures, and Buildings</u>

Implementation of the IPM Program on agricultural lands and within structures and buildings would not result in any adverse effects on special-status plant species individuals or habitat, because no suitable habitat exists within these areas<u> (e.g., active agricultural lands are regularly disturbed from farming activities such as tilling)</u>. While special-status plant species habitat is not present within structures and buildings<u> or on active agricultural lands</u>, IPM treatments for ground squirrels <u>and other rodents</u> in the vicinity of structures and buildings <u>and margins of agricultural lands (where active farming activities are not applied)</u> may occur within suitable habitat for special-status plants. The ~~ripping~~ <u>removal</u> of <u>rodent</u> burrows using a tractor could damage individual special-status plants should they occur within the treatment site, reducing the population and distribution of these rare species. However, several EPMs would be implemented to minimize and avoid impacts to special-status plants, including pre-treatment surveys for special-status plants and flagging or mapping all identified occurrences and avoiding them (EPM BIO-2), prohibiting broadcast spraying of non-selective herbicides within 15 feet of special-status plants (EPM BIO-3), restricting the timing of IPM treatments near special-status plants to avoid damage and limiting treatments to those that do not affect seeds or underground parts (EPM BIO-4), and collecting seeds and other propagules of special-status plants prior to IPM treatments for post-treatment restoration if needed (EPM BIO-5). Therefore, no substantial effects to special-status plants would occur from the implementation of the IPM Program.

<u>Recreation Facilities and Natural Lands</u>

Special-status plants and habitat may occur within recreational facilities (e.g., along road and trail margins) and on natural lands where IPM Program activities would take place. Manual, mechanical, and herbicide treatments for nuisance and invasive plants may damage or kill special-status plants should they occur within a treatment site. Manual and mechanical treatments could damage special-status plants while digging, clearing, or mowing in areas where special-status plants are present. Herbicide treatments could damage special-status plants if the herbicide reaches a special-status plant through drift or leaching/transport. Damage or death of individuals could reduce the population and distribution of these rare species, which would be a substantial adverse effect. However, several EPMs would be implemented to minimize and avoid impacts to special-status plants, including pre-treatment surveys for special-status plants and flagging or mapping all identified occurrences and avoiding them (EPM BIO-2), prohibiting broadcast spraying of non-selective herbicides within 15 feet of special-status plants (EPM BIO-3), restricting the timing of IPM treatments near special-status plants and limiting treatments to those that do not affect seeds or underground parts (EPM BIO-4), and collecting seeds and other propagules of special-status plants prior to IPM treatments for post-treatment restoration if needed (EPM BIO-5). In addition, EPM HAZ-4 requires specific methods for handling of all pesticides (e.g., proper storage, disposal, and spill prevention techniques) and EPM HAZ-5 requires specific methods for pesticide application to minimize offsite transport (e.g., specific weather parameters to reduce potential drift and leaching/transport). The damage or killing of special-status plants through manual, mechanical, and chemical treatments would be avoided and minimized through the implementation of these EPMs by requiring pre-treatment surveys, avoidance and treatment limitations within 15 feet of special-status plants, and specific weather parameters for herbicide use. Furthermore, in the long-term, the IPM Program may result in beneficial impacts to special-status species by removing detrimental pest species. Therefore, adverse effects to special-status plants from the IPM Program within recreational facilities and natural lands would not be substantial.

Special-Status Plants Impact Summary

Implementation of the IPM Program on agricultural lands and within structures and buildings would not result in any adverse effects on special-status plants due a lack of suitable habitat in those areas. Implementation of the IPM Program in the vicinity of structures and buildings for ground squirrel control and on recreation facilities and natural lands has the potential to result in adverse effects on special-status plants; however, as discussed above, implementation of EPMs would avoid and minimize impacts to special-status plants through surveys. Therefore, the impact from IPM Program implementation to special-status plants would be **less than significant**.

Impact 3.3-2: Potential to Substantially Affect Special-Status Wildlife Species

Implementation of IPM Program activities may result in the injury, mortality, or disruption of reproduction of special-status invertebrates, special-status fishes, special-status amphibians, special-status reptiles, special-status birds, special-status mammals, and loss of nests of common raptors and other nesting birds. After considering the implementation of applicable EPMs, the impact to special-status wildlife species would be **potentially significant**.

There are three special status invertebrates, four special-status fish, 10 special-status amphibians and reptiles, 13 special-status birds, and nine special-status mammals that are known to occur or could occur in the IPM Program Area (Appendix C, "Special-Status Species"). The IPM Program would result in a long-term benefit to special-status wildlife occurring in the IPM Program Area by removing invasive animals that may compete with special-status species and invasive plants that may reduce habitat suitability, However, to accomplish its goals, the IPM Program would implement manual, mechanical, and chemical treatments, which could result in adverse effects on special-status wildlife species if present within IPM treatment areas.

Bay Checkerspot Butterfly

Bay checkerspot is listed under the ESA as threatened. Habitat for the species occurs entirely within serpentine land covers, which are present within the IPM Program Area (see Table 3.3-2). The Bay checkerspot butterfly has two larval host plants, dwarf plantain (*Plantago erecta*) and purple owl's clover (*Castilleja densiflora* or *C. exserta*). Host plants are a primary constituent element (PCE) of critical habitat for the Bay checkerspot butterfly (66 FR, 21450). The IPM Program would implement manual, mechanical, and chemical treatments to manage pests within IPM Program Area preserves, which could result in adverse effects on Bay checkerspot butterfly if it or its habitat is present within IPM treatment areas.

Agricultural Lands, Structures and Buildings

Implementation of the IPM Program on agricultural lands and within structures and buildings would not result in any adverse effects on Bay checkerspot butterfly individuals or habitat, because no suitable habitat or PCEs of critical habitat exists within these areas. However, IPM treatments for ground squirrels in the vicinity of structures and buildings and on the margins of agricultural lands may occur within suitable habitat for Bay checkerspot butterfly. The ~~ripping~~ removal of rodent burrows using a tractor could result in damage or death of Bay checkerspot butterfly host plants. Damage or death of host plants would reduce the available habitat for Bay checkerspot butterfly and potentially kill individual larva and eggs. This would have a substantial negative effect on the ability of the species to reproduce and maintain populations within the IPM Program Area.

Recreation Facilities and Natural Lands

Implementation of the IPM Program within recreational facilities (e.g., along road and trail margins) and on natural lands may occur within Bay checkerspot butterfly habitat and critical habitat for the species. Manual and mechanical invasive plant treatments such as mowing, grubbing/scraping, and tree removal may damage or kill host plants within a treatment site should they occur. Spraying of herbicides and pyrethrin-type insecticides could also damage or kill host plants, Bay checkerspot butterflies, or host plant pollinators if present within or immediately adjacent to a treatment area. Damage or death of host plants would reduce the available habitat for Bay checkerspot butterfly and potentially kill individual larva and eggs. This would have a substantial effect on the ability of the species to reproduce and maintain populations within the IPM Program Area. The Authority would implement EPM HAZ-4 and EPM HAZ-5, which require specific measures related to pesticide handling and application to minimize the potential for pesticide drift, offsite pesticide transport, and pesticide spills. These would help to minimize indirect impacts to Bay checkerspot butterflies from pesticide use. However, these EPMs would not sufficiently avoid effects because occurrences of host plants and Bay checkerspot butterfly may not be known and therefore may be inadvertently disturbed, injured, or killed during manual, mechanical, and chemical treatments.

Bay Checkerspot Butterfly Impact Summary

Implementation of the IPM Program on agricultural lands and within buildings and structures would not result in adverse effects on Bay checkerspot butterfly due a lack of suitable habitat in those areas. Implementation of the IPM Program in the vicinity of structures and buildings and on the margins of agricultural lands for rodent and ground squirrel control and manual, mechanical, and chemical treatments under the IPM Program within recreational facilities and natural lands has the potential to result in substantial adverse effects on Bay checkerspot butterfly and individual Bay checkerspot butterflies may be inadvertently disturbed, injured, or killed by removing host plants and applying pesticides. Therefore, the impact to Bay checkerspot butterfly and its critical habitat in the vicinity of structures and buildings, on the margins of agricultural lands, and within recreational facilities and natural lands would be **potentially significant**.

Mitigation Measure 3.3-2a: Avoid Loss of Bay Checkerspot Butterfly and Host Plants

- The Authority will obtain take coverage for Bay checkerspot butterfly under the Habitat Plan for covered activities (i.e., manual and mechanical treatments). The Authority will implement all applicable permit conditions required by the Habitat Plan to avoid and minimize injury, death, disturbance, or habitat degradation for this special-status species. If take coverage is not obtained for manual and mechanical activities, the Authority will implement the following measures:
  - EPM BIO-2 and EPM BIO-4 shall be implemented for Bay checkerspot butterfly host plant species (dwarf plantain and purple owl's clover). Per these EPMs, the Authority will conduct pre-treatment surveys for dwarf plantain and purple owl's clover and flag and/or map and avoid all occurrences during manual and mechanical treatments. When the host plants are dormant, only manual and mechanical treatment activities that do not affect seeds or underground parts shall be used within 15 feet of dwarf plantain and purple owl's clover occurrences.
- If pyrethrin-type spray insecticides are proposed for use (e.g., on a wasps’ nest) within Bay checkerspot butterfly suitable habitat, they shall be applied by a qualified biologist with experience identifying Bay checkerspot butterfly. Prior to any application, a visual survey will be conducted within 15 feet of the application site. If dwarf plantain and purple owl's clover are observed within 15 feet of a target wasps’ nest, no pyrethrin-type spray insecticides will be used unless it is confirmed no Bay checkerspot butterfly eggs or larvae are present, and only immediately following the absence determination. If adult Bay checkerspot butterflies are found during the survey, no pyrethrin-type spray insecticides will be used until the butterflies have left the 15-foot buffer on their own.
- If broadcast spraying (i.e., from a boom on an ATV) of herbicides is proposed for use within Bay checkerspot butterfly suitable habitat, EPM BIO-2 through EPM BIO-5 will be implemented. These measures will require identification, flagging, and avoidance of dwarf plantain and purple owl's clover and prohibit the broadcast spraying of non-selective herbicides (i.e., herbicides that injure all plant species that are directly exposed to the herbicide) within 15 feet of dwarf plantain and purple owl's clover. Non-selective herbicides will only be broadcast sprayed in suitable habitat if it is applied during the dormant period of dwarf plantain and purple owl's clover (July through February) and does not damage seeds or underground parts.

<u>Significance after Mitigation</u>

Implementation of Mitigation Measure 3.3-2a would avoid adverse effects on Bay checkerspot butterfly and its habitat by restricting the spraying of non-selective herbicides near Bay checkerspot butterfly host plants within suitable Bay checkerspot butterfly habitat. In addition, for mechanical and manual activities, the Authority will either obtain take coverage under the Habitat Plan and implement all required measures (e.g., locate activities as far away from high-quality serpentine habitat as feasible), or if take coverage is not obtained, the Authority will conduct pre-treatment surveys for host plants within suitable habitat, map and avoid all occurrences, use manual and mechanical treatments that avoid damage to host plants, avoid use of insecticides within 15 feet of host plants when butterflies are present, and limit the broadcast spraying of non-selective herbicides within 15 feet of host plants to the dormant period. These restrictions will avoid damage or removal of host plants and injury or mortality of Bay checkerspot butterfly. Therefore, with implementation of Mitigation Measure 3.3-2a, the impact to Bay checkerspot butterfly would be **less than significant after mitigation**.

Crotch Bumble Bee

Crotch bumble bees (*Bombus crotchii*) have been recently recorded within Santa Clara County in the vicinity of the IPM Program Area (CNDDB 2021). The decline of native bees prompted the California Fish and Game Commission in 2019 to designate four bumble bee species, including Crotch bumble bee, as candidate species under CESA, granting them protection until its status is decided. In November 2020, the County of Sacramento Superior Court ruled that insects are not eligible for listing under CESA (County of Sacramento 2020). Although this recent court decision sets aside the listing decision of Crotch bumble bee as a candidate species and its interim protection, the species nonetheless meets the criteria of endangered, rare, or threatened species, as defined in Section 15380 of the State CEQA Guidelines (14 CCR Section 15000 et seq.) due to its limited range and declining numbers. Therefore, it is considered a special-status species in this PEIR.

There have been few studies of the ecology and habitat requirements of Crotch bumble bee; however, general aspects of its biology are known. Crotch bumble bee is a colonial nesting species that nests underground and may be found in grasslands, chaparral, and scrub habitats with adequate flowering plants for nectar (i.e., suitable habitat) within the IPM Program Area. The species may use abandoned rodent burrows and similar features within suitable habitat for nest colonies. Solitary queens may overwinter under leaf litter or in small cavities a few centimeters into loose soil. The flight season for Crotch bumble bee queens is from late February to late October, peaking in early April and July. The flight season for workers and males is from late March through September when the colony is active. Crotch bumble bees are generalist foragers that feed from open flowers with short corollas (Xerces 2018).

<u>Agricultural Lands, Structures and Buildings</u>

Implementation of the IPM Program within structures and buildings would not result in adverse effects to Crotch bumble bee because there is no suitable habitat for the species in these areas. IPM treatments for ground squirrels that occur around structures and buildings that are located within grassland, scrub, or chaparral habitat may result in impacts to Crotch bumble bee. If the ~~ripping~~ <u>removal</u> of <u>rodent</u> burrows occurs between October and March, the inadvertent killing of individual overwintering queens could occur. However, due to the limited area of impact and the small number of potential queens affected, this loss of individual queens would not likely result in a substantial negative effect on the ability of the species to reproduce and maintain local populations.

~~Ripping~~ <u>Removal</u> of <u>rodent</u> burrows could also result in the direct damage or destruction to Crotch bumble bee nest colonies if this activity occurs around structures and buildings that are located within grassland, scrub, or chaparral habitat when nests are present (March through September). The loss of a colony would result in the potential loss of many young queens and males and could have a substantial negative effect on the ability of the species to reproduce and maintain local populations, thereby restricting the range of the species.

Suitable habitat for Crotch bumble bee may also occur along the margins of active agriculture fields that contain suitable nectar sources or rodent burrows and other underground cavities for nests. Suitable habitat is not likely to occur where active agricultural practices (e.g., tilling, discing) are conducted because the soil is consistently disturbed, and no substantial nectar sources or rodent burrows would be present. If ground disturbing treatment activities (e.g., hoeing, discing<u>, rodent burrow removal</u>) are proposed on field margins with suitable habitat when nests are present

(March through September), it could result in the direct destruction of Crotch bumble bee nest colonies. In addition, the use of weedmats on suitable habitat along field margins could trap bees resulting in loss of the colony, also resulting in colony destruction.

Recreation Facilities and Natural Lands

IPM Program activities would occur within recreational facilities (e.g., the margins of trails, roads, and picnic areas) and natural lands that may be suitable habitat for Crotch bumble bee. Ground disturbing treatments (e.g., digging, scraping, installation of exclusion fencing for feral pigs and bullfrogs), mechanical treatments using vehicles (e.g., ATVs and mowers), and pyrethrin-type insecticide applications that occur in suitable habitat between October and March could result in the killing of individual overwintering queens if any are located within the treatment area. However, due to the limited area of impact and the small number of potential queens affected, this loss of individual queens would not likely result in a substantial negative effect on the ability of the species to reproduce and maintain local populations.

Ground disturbing treatments (e.g., digging, scraping, installation of exclusion fencing for feral pigs and bullfrogs) and pyrethrin-type insecticide application that occur where recreational facilities and natural lands contain suitable habitats during the period when nests are present (March through September) could result in the direct damage or destruction to Crotch bumble bee nest colonies. The loss of nests would have a substantial negative effect on the ability of the species to reproduce and maintain local populations, thereby restricting the range of the species.

The application of non-selective herbicides and mechanical vegetation removal (e.g., mowing, weed whipping) conducted within recreational facilities would likely only impact a small area of floral resources; therefore, these treatments would not result in a substantial loss of floral resources or subsequent loss of nest colonies. However, in natural lands that contain suitable habitat, mechanical treatments and the spray application of non-selective herbicides that occur during the time that nest colonies are active (March through September) could inadvertently impact a large area of nectar sources for Crotch bumble bee, which could substantially reduce the available nectar sources around the colony to the extent that they are insufficient to support the colony, which could result in the loss of the nest. This would be a substantial negative effect on the ability of the species to reproduce and maintain local populations, thereby restricting the range of the species. The Authority would implement EPM HAZ-4 and EPM HAZ-5, which require specific measures related to pesticide handling and application to minimize the potential for pesticide drift, offsite pesticide transport, and pesticide spills. These would help to minimize impacts to Crotch bumble bee nectar sources from pesticide use. However, these EPMs would not sufficiently avoid the potential for substantial adverse effects from pesticide application on flowering plants that provide nectar resources for nest colonies.

Crotch Bumble Bee Impact Summary

Implementation of the IPM Program could result in direct impacts to Crotch bumble bee nest colonies, if present, from ~~ground squirrel~~ rodent burrow removal adjacent to structures located within grassland, scrub, or chaparral habitat; ground disturbing treatments and use of weed mats within the margins of agricultural fields; and ground disturbing treatments and pyrethrin-type insecticide application within recreation facilities and natural lands occurring from March through September within suitable habitat. In addition, substantial adverse effects to nest colonies could occur indirectly through the spray application of non-selective herbicides and mechanical vegetation removal (e.g., mowing, weed whipping) on natural lands, if conducted in suitable habitat from March through September, due to a substantial reduction of nectar resources. Therefore, the impact to Crotch bumble bee would be **potentially significant**.

Mitigation Measure 3.3-2b: Avoid Loss of Crotch Bumble Bee Nest Colonies

- To avoid direct disturbance of Crotch bumble bee nest colonies, if ground disturbing treatments (e.g., digging, scraping, hoeing, rodent burrow removal, installation of exclusion fencing for feral pigs or bullfrogs), use of weedmats, or pyrethrin-type insecticide treatments are proposed in Crotch bumble bee suitable habitat during the period when nest colonies may be present (March through September), prior to implementing treatments, the Authority will conduct field surveys within treatment sites for the presence of the species.
  - Surveys to determine occupancy of suitable habitat by Crotch bumble bee will occur within 1 year prior to treatment implementation and at four evenly spaced sampling periods within the flight season (March

through September). Surveys will follow the general procedures in the USFWS' Survey Protocols for the Rusty Patched Bumble Bee (*Bombus affinis*) (USFWS 2018). Surveys will use non-lethal netting methods for one (1) person-hour per 3 acres of the treatment site or until 150 bumble bees are sighted, whichever comes first. If no Crotch bumble bees are detected, then no further survey of that treatment area or further mitigation is required. Alternatively, the Authority may assume presence within suitable habitat, and apply only the additional measure below.

- If Crotch bumble bees are detected within the treatment area, or presence is assumed, and ground disturbing treatments (e.g., digging, scraping, hoeing, installation of exclusion fencing for feral pigs or bullfrogs), weed mats, or use of pyrethrin-type spray insecticides are planned; a pre-treatment survey will occur within 30 days of the treatment to identify the location of active nest colonies.
- Crotch bumble bee nest colonies detected within the treatment area will be flagged and no ground disturbing treatments, weed mats, or pyrethrin-type spray insecticides will be used within 15 feet of the colony during March through September, or until the colony is no longer active (i.e., no bees are seen flying in or out of the nest for three consecutive days). Air space shall be maintained between the active nest colony and nectar resources to facilitate foraging.

- To avoid loss of Crotch bumble bee nest colonies through removal of floral resources, within occupied habitat (presence can be assumed or follow survey requirements above to determine occupancy), mechanical vegetation removal and spraying of non-selective herbicide treatments will be conducted such that the entirety of floral resources are not removed during the period when colonies may be present (March through September), and untreated portions of occupied habitat are retained adjacent to treatment areas to provide floral resources and refuge for Crotch bumble bees.
- If in the future Crotch bumble bee is listed under the CESA and take is not covered under the Valley Habitat Plan, the Authority will consult with CDFW to determine additional measures that may be required to avoid take of individuals, or will apply for an Incidental Take Permit. Additional measures may include, but are not limited to, further limitations on the use of pyrethrin-type spray insecticides and mechanical treatment during the flight season, and limitations on ground disturbing treatments in overwintering habitat. If agreement is reached, the Authority shall implement all measures developed in consultation with CDFW.

Significance after Mitigation

Implementation of Mitigation Measure 3.3-2b: would avoid adverse effects on the Crotch bumble bee by avoiding the disturbance and destruction of nest colonies through surveys and avoidance, and prohibiting ground disturbing treatments and pyrethrin-type insecticide application in the vicinity of the nest during the season when colonies are active. This measure would also preserve adequate nectar resources around active colonies during the flight period to support reproduction. Therefore, with implementation of Mitigation Measure 3.3-2b, the impact to Crotch bumble bee would be **less than significant with mitigation**.

Monarch Butterfly

The western population of monarch butterfly (*Danaus plexippus*) overwinters within wind protected eucalyptus, Monterey pine, and cypress groves along the coast. These overwintering roosts are typically located within 1.5 miles from the ocean or bays; therefore, these overwintering roosts are not likely to occur within any of the preserves included in the IPM Program Area, which are located 10 miles or more from the coast. However, individual monarch butterflies, larvae, and host plants have been recorded within the IPM Program Area (Western Monarch and Milkweed Mapper 2021a).

Adult monarch butterflies require a diversity of nectar resources for feeding during migration and breeding, and milkweed host plants (*Asclepias* spp.) to complete its lifecycle (USFWS 2020a). During the spring and summer, adult females lay eggs on milkweed host plants, which are the only food source for larvae. Typically, a single egg is laid on an individual host plant (Western Monarch and Milkweed Mapper 2021b). Monarch butterflies may forage in various habitats throughout the IPM Program Area, while milkweed host plants may occur in grasslands, woodlands, and wetlands. Due to documented decreases in overwintering populations, the USFWS determined that the listing of monarch as threatened or endangered was warranted, but precluded by work on other higher priority species (USFWS 2020b). Staff from the USFWS reached out to the Authority, the Habitat Agency, and other land managers in early 2021 recommending that for CEQA and NEPA projects where suitable grassland habitat is present, milkweed host plants be flagged and avoided, and restoration of these areas should occur to avoid the extinction of the species. Because the monarch became a candidate for listing under the ESA and the USFWS specifically recommended land managers to take measures to avoid the extinction of the monarch butterfly, it is considered a special-status species in this PEIR and EPMs were developed to minimize impacts to the species and its habitat.

Agricultural Lands, Structures and Buildings

Implementation of the IPM Program on agricultural lands and within structures and buildings would not result in adverse effects on monarch butterfly individuals or habitat, because no suitable overwintering or breeding habitat exists within these areas. However, IPM treatments for ground squirrels may occur around structures and buildings that are within suitable habitat for monarch butterfly host plants. The ~~ripping~~ removal of rodent burrows using a tractor could inadvertently damage these plants if they occur in the vicinity of a burrow. Also, rodent burrow removal and mechanical vegetation removal (e.g., mowing) occurring along the margins of agricultural fields could damage or kill monarch host plants, if present. Damage or death of host plants would slightly reduce the available breeding habitat for monarch butterfly and could potentially kill individual larva and eggs. The Authority would implement EPM BIO-10, which requires pre-treatment surveys for and avoidance of monarch butterfly host plants. Therefore, IPM treatments on agricultural lands and around structures and buildings would not have a substantial negative effect on the ability of monarch butterfly to reproduce or maintain populations in the IPM Program Area.

Recreation Facilities and Natural Lands

While woodland and forested habitat is present on natural lands and adjacent to recreational facilities (e.g., along road and trail margins) within the IPM Program Area, the distance from the coast makes it unlikely that monarch butterfly overwintering roosts will occur. Therefore, IPM treatments are not likely to have an adverse effect on overwintering roosts. However, manual and mechanical invasive plant treatments may damage or kill monarch butterfly host plants should they occur within a treatment site. Spraying of herbicides could also damage or kill host plants if present within or immediately adjacent to a treatment area. Damage or death of host plants would reduce the available habitat for monarch butterfly and could potentially kill individual larva and eggs, if present. The Authority will implement EPM BIO-9, EPM BIO-10 and EPM BIO-11 to avoid and minimize impacts on monarchs, which require surveys for and avoidance of overwintering sites should they occur, surveys for and avoidance of host plants, and prohibit broadcast spraying of non-selective herbicides within 15 feet of monarch host plants. The Authority would also implement EPM HAZ-4 and EPM HAZ-5, which require specific measures related to pesticide handling and application to minimize the potential for pesticide drift, offsite pesticide transport, and pesticide spills. These would help to avoid and minimize indirect impacts to monarch butterflies and their host plants from spraying of herbicides.

Monarch Butterfly Impact Summary

Implementation of ~~ground squirrel~~ rodent burrow removal adjacent to structures and on the margin of agricultural lands; mechanical vegetation removal within the margins of agricultural fields; and manual and mechanical vegetation removal and spraying of herbicides within recreation facilities and natural lands may result in the direct loss of individual monarchs or eggs/larvae, or monarch butterfly host plants. However, the loss of individual host plants, larva, and eggs would not have a substantial adverse effect on the local population of monarch butterfly because a large proportion of available breeding habitat would remain unaffected in the IPM Program Area and because the loss of individual monarch butterflies would not substantially reduce the number or restrict the range of the species. In addition, the authority would implement EPMs that reduce potential impacts to monarch butterflies and their host plants by requiring the avoidance of overwintering sites if ever present, pre-treatment surveys for and avoidance of host plants, and limitations regarding herbicide use within 15 feet of host plants. Therefore, the impact to monarch butterfly would be **less than significant**.

Special-Status Fish

Trapping, electroshocking, gigging, and shooting for pest animal removal under the IPM Program would typically occur within ponds; however, it could also occur within perennial rivers and streams that is habitat for the Monterey roach (*Lavinia symmetricus subditus*), a CDFW species of special concern. As described in Chapter 2, "Program Description," the Authority would not conduct any IPM treatments within central California coast steelhead or south central California coast steelhead habitat. Manual and mechanical invasive plant treatments within the Pajaro River Agricultural Preserve may occur adjacent to critical habitat (or PCEs of critical habitat) for the ESA listed south central California coast steelhead, while manual, mechanical, and chemical IPM Program activities within the Sierra Vista Open Space Preserve may occur adjacent to critical habitat (or PCEs of critical habitat) for the central California coast steelhead (Santa Clara County et al. 2012; 70 FR 52488). Monterey hitch (*Lavinia exilicauda harengus*) is a CDFW species of special concern that occurs in the Pajaro River, lower Uvas Creek, and lower Llagas Creek. The portion of the IPM Program Area that overlaps with habitat for Monterey hitch also overlaps with that of south central California coast steelhead, and as described above no treatments will occur within this habitat. However, treatments within the Pajaro River Agricultural Preserve may occur adjacent to habitat for Monterey hitch.

<u>Structures and Buildings</u>

Implementation of the IPM program within structures and buildings would not result in any direct adverse effects on special-status fish individuals or habitat, because no suitable habitat or PCE of critical habitat exists within these areas. The ~~ripping~~ <u>removal</u> of ~~ground squirrel~~ <u>rodent</u> burrows in the vicinity of structures and buildings could result in runoff of sediments to special-status fish habitat that could degrade water quality. Degradation of water quality can reduce or inhibit spawning and foraging by special-status fishes in affected waters. In addition, water quality is a PCE for central California coast steelhead, and a reduction in water quality within special-status fish habitat or critical habitat would be a substantial adverse effect. However, EPM BIO-1 requires a pre-treatment surveys for aquatic resources and prohibits ground disturbing mechanical treatments or any chemical treatments within 15 feet of aquatic resources. The implementation of EPM BIO-1 would avoid and minimize the likelihood of sediment runoff entering special-status fish habitat and critical habitat; therefore, no substantial adverse effects to special status fish would occur from implementation of ground squirrel control.

<u>Recreation Facilities and Natural Lands</u>

IPM Program activities would occur within recreational facilities (e.g., trails, roads, and picnic areas) and natural lands that may be directly adjacent to Monterey roach and central California coast steelhead habitat, as well as critical habitat for central California coast steelhead. Invasive plant treatments such as tree removal, grubbing, mowing, use of herbicides, and use of pyrethrin-type insecticides adjacent to special-status fish habitat could result in runoff of sediment and pesticides that would degrade water quality. Degradation of water quality can reduce or inhibit spawning and foraging by special-status fishes in affected waters. In addition, water quality is a PCE for central California coast steelhead, and a reduction in water quality within special-status fish habitat or critical habitat would be a substantial adverse effect. However, the IPM Program would implement EPMs to reduce potential adverse effects to aquatic resources. EPM HAZ-4 requires specific methods for handling of all pesticides to minimize accidental spills. EPM HAZ-5 requires measures to reduce pesticide drift, precipitation related runoff, and other measures to reduce the potential for pesticides to enter non-target areas. EPM BIO-1 requires pre-treatment surveys for aquatic resources, prohibits ground disturbing mechanical treatments and all chemical treatments within 15 feet of aquatic resources, and prohibits broadcast spraying of herbicides within 50 feet of aquatic resources (unless the compound is specifically registered for aquatic use). Implementation of these EPMs as a part of the IPM Program would avoid and minimize the likelihood of sediment and pesticide runoff, and pesticide drift to enter special-status fish habitat and critical habitat; therefore, no substantial adverse effects to special status fish would occur from implementation of the IPM Program on recreational facilities and natural lands.

Trapping, electroshocking, gigging, and shooting are proposed treatment methods for animal pest control on natural lands. These treatments would typically occur in ponds; however, they could also occur within perennial streams that are habitat for Monterey roach. Trapping, gigging, shooting, and electroshocking in perennial streams may result in accidental injury or mortality of Monterey roach. While unlikely, traps set for target species could ensnare roaches if not designed to let small fishes pass through, and gigging and shooting that targets bullfrogs could inadvertently hit roaches if they are present where this activity occurs. Electroshocking to remove non-native fishes is a non-lethal removal technique; however, injury or mortality of roaches may occur if any individuals are subject to electroshocking and accidentally removed. Adverse effects from these activities (e.g., injury or mortality to individual Monterey roaches) would not be substantial because loss of individual Monterey roaches would not substantially reduce the number or restrict the range of the species. However, gigging, shooting, and use of electroshockers during the spawning season (March through June) for Monterey roach could result in disruption of spawning behaviors and reduction in reproductive output. Disruption of Monterey roach spawning would be a potentially substantial adverse effect.

Agricultural Lands

Manual and mechanical treatment activities (e.g., hoeing, mowing, discing, rodent burrow removal, and use of weedmats) may occur within agricultural lands that are adjacent to habitat for special-status fish and critical habitat for south central California coast steelhead. As discussed for recreational facilities, manual and mechanical IPM Program treatments have the potential to result in runoff and sedimentation into suitable special-status fish habitat and critical habitat for south central California coast steelhead. However, implementation of EPM BIO-1 requires pre-treatment surveys for aquatic resources and prohibits ground disturbing mechanical treatments within 15 feet of aquatic resources. Furthermore, agricultural activities already occur on agricultural preserves and implementation of the IPM Program is expected to increase IPM treatment activities by up to a few additional treatments over current levels, which would not substantially increase the generation of sediments and runoff. Therefore, no substantial adverse effects on special-status fish habitat or critical habitat for south central California coast steelhead would occur on agricultural lands.

Special-Status Fish Impact Summary

Implementation of the IPM Program within structures and buildings would not result in adverse effects on special-status fishes or critical habitat due a lack of suitable habitat in those areas. Implementation of manual and mechanical treatments under the IPM Program would not substantially increase activities over existing conditions, no ground disturbing mechanical treatments or chemical treatments would occur within 15 feet of aquatic resources, and no broadcast spraying of herbicides would occur within 50 feet of aquatic resources (unless the compound is specifically registered for aquatic use). However, manual removal of non-native fishes, bullfrogs, and turtles in the IPM Program Area may result in disruption of spawning for Monterey roach; therefore, the impact would be **potentially significant** for that species.

Mitigation Measure 3.3-2c: Avoid Injury or Loss of Special-Status Fishes

- The Authority will not conduct trapping, shooting, gigging, or electroshocking during the spawning season for Monterey roach (March through June) within suitable habitat (i.e., perennial streams). Shooting, trapping, gigging, and electroshocking of aquatic species will only be conducted by a qualified biologist with experience identifying special-status fishes.

Significance after Mitigation

The implementation of Mitigation Measure 3.3-2b would avoid and minimize adverse effects on special-status fishes from the implementation of the IPM Program by prohibiting activities that could disrupt of Monterey roach spawning activities and by requiring a qualified biologist able to identify Monterey roach to implement IPM activities that would occur within perennial streams. Therefore, Mitigation Measure 3.3-2b would reduce the impact to special status fishes to **less than significant after mitigation**.

Special-Status Amphibians

There are several special-status amphibians that are known to occur or could occur within the IPM Program Area (refer to Appendix C, "Special-Status Species"). These special-status amphibians include the California red-legged frog (listed under ESA); California tiger salamander (listed under ESA and CESA); foothill yellow-legged frog (*Rana boylii*) (candidate for listing under CESA); and the California giant salamander (*Dicamptodon ensatus*), coast range newt (*Taricha torosa*), and Santa Cruz black salamander (*Aneides niger*) (all CDFW species of special concern). In addition, the IPM Program Area contains critical habitat for the California tiger salamander (70 FR 49380) and California red-legged frog (75 FR 12816). PCEs for critical habitat may also be present in the IPM Program Area.

Structures and Buildings

Implementation of the IPM Program within structures and buildings would not result in any adverse effects on special-status amphibians, because no suitable habitat or PCEs of critical habitat exists within these areas. If structures and buildings are located within suitable upland habitat or critical habitat, then the ~~ripping of ground squirrel~~ removal of rodent burrows adjacent to buildings and structures may have an adverse effect special-status amphibians. Ground squirrel burrows are used by California tiger salamander and California red-legged frog as upland refugia. Should rodent burrows be occupied by California tiger salamander or California red-legged frog when ~~ripping~~ removal of the burrows are implemented this would result in burrow collapse, entombing and killing individuals. In addition, should the ~~ripping of ground squirrel burrows~~ removal of rodent burrows occur adjacent to aquatic habitat for special-status amphibians, runoff of sediments could occur and degrade water quality. However, EPM BIO-1 requires pre-treatment surveys for aquatic resources, prohibits ground disturbing mechanical treatments and all chemical treatments within 15 feet of aquatic resources. Implementation of EPM BIO-1 as part of the IPM Program would minimize the potential for water quality degradation that could adversely affect special-status amphibian habitat; however, there is a potential to harm special-status amphibians from the ~~ripping of ground squirrel~~ removal of rodent burrows.

Recreation Facilities and Natural Lands

IPM Program treatment activities would occur within recreational facilities (e.g., trails, roads, bridges) and natural lands that may be within upland habitat for special-status amphibians, while other recreational facilities (e.g., picnic areas and parking lots) are not suitable habitat for these species, but may be directly adjacent to suitable upland and aquatic habitat. Generally, manual, mechanical, and chemical treatment activities for invasive plant control are not likely to substantially effect the suitability of upland habitat for special-status amphibians due to the acreage of vegetation affected relative to the acreage available for these species within the IPM Program Area. However, spraying of herbicides or insecticides, and manual and mechanical activities such as mowing, grubbing, tree removal, trapping, gigging/shooting, and electroshocking that occur within upland or aquatic habitat could result in the incidental injury or death of special-status amphibians, or runoff of sediment and herbicides that could degrade water quality.

To avoid and minimize adverse effects on special-status amphibians, the Authority would implement EPM HAZ-4 which requires specific methods for handling of all pesticides to minimize accidental spills; EPM HAZ-5 which includes measures to reduce pesticide drift, precipitation related runoff, and other measures to reduce the potential for pesticides to enter non-target areas; and EPM BIO-1 which requires pre-treatment surveys for aquatic resources, prohibits ground disturbing mechanical treatments and all chemical treatments within 15 feet of aquatic resources, and prohibits the broadcast spraying of herbicides within 50 feet of aquatic features (unless the compound is specifically registered for aquatic use). In addition, EPM BIO-8 would also be implemented, which would limit herbicide use in California red-legged frog habitat in accordance with the California red legged frog injunction (Center for Biological Diversity v. U.S. Environmental Protection Agency (2006) Case No.: 02-1580-JSW). Where occupied California red-legged frog habitat is habitat for other special-status species, this 60-foot buffer will avoid impacts to those species as well. Implementation of these EPMs as part of the IPM Program would avoid and minimize the likelihood of adverse effects on special-status amphibians from mechanical and chemical treatments; however, there is a potential to harm special-status amphibians from treatments that would occur within aquatic habitat (i.e., trapping, gigging/shooting, and electroshocking).

Agricultural Lands

Agricultural lands within the IPM Program Area may contain suitable upland habitat for special-status amphibians along the margins of existing agricultural fields and suitable aquatic habitat in adjacent streams. IPM Program activities that would occur on agricultural lands (e. g., hoeing, mowing, dis~~k~~cing, rodent burrow removal, and use of weedmats) would not likely have a substantial effect on habitat within these areas due to the existing disturbance from agricultural operations and required pre-treatment surveys and disturbance buffers around aquatic resources (EPM BIO-1). To avoid and minimize impacts to California red-legged frog, the authority would implement EPM BIO-8, which limits chemical treatments within a 60-foot buffer of California red-legged frog habitat. However, the manual and mechanical IPM Program activities proposed for agricultural lands could result in incidental injury or death of special-status amphibians if these species are present when these activities occur.

Special-Status Amphibian Impact Summary

Implementation of the IPM Program within structures and buildings would not result in adverse effects on special-status amphibians or critical habitat due a lack of habitat in those areas; however, ground squirrel control adjacent to buildings and structures could result in incidental injury or death of special-status amphibians. On natural and recreational lands, trapping, gigging, shooting, electroshocking, manual, mechanical, and chemical treatments also have the potential to result in incidental injury or death of special-status amphibians. Implementation of IPM treatments on agricultural lands may result in incidental injury or death of special-status amphibian individuals, if present when these activities occur. Therefore, the impact would be **potentially significant**.

Mitigation Measure 3.3-2d: Avoid Impacts to California Tiger Salamander and California Red-Legged Frog

- The Authority will obtain take coverage for California tiger salamander and California red-legged frog for covered IPM activities (i.e., manual and mechanical treatments). The Authority will implement all applicable permit conditions required by the Habitat Plan to avoid and minimize injury, death, disturbance, or habitat degradation for these special-status species. If take coverage is not obtained for manual and mechanical activities, the Authority will implement the following measures:
  - Conduct field surveys within treatment sites to determine the presence of suitable California tiger salamander and California red-legged frog habitat.
  - Prohibit burrow ~~ripping~~ removal for ~~ground squirrel~~ rodent control where suitable California tiger salamander upland habitat is present to avoid harming individual California tiger salamanders that may be present in empty burrows.
  - Prohibit mechanical and chemical treatments in suitable California tiger salamander upland habitat during the wet season (generally October 15 through May), and within 24 hours of rainfall. Only manual IPM treatment activities shall be conducted in suitable upland habitat during the wet season to avoid injury or mortality of these species during overland movement.
  - Prior to conducting IPM treatments in California tiger salamander or California red-legged frog suitable habitat that could result in incidental injury or death of individuals as determined by a qualified biologist (e.g., mechanical treatments that use large, ground disturbing equipment such as tractor-operated mowers), and within 14 days of treatment, pre-treatment clearance surveys shall be conducted. If individuals of either species are found within a treatment site during pre-treatment clearance surveys, monitoring shall be conducted during the treatment (with the exception of pond draining as discussed below). If California tiger salamander or California red-legged frog individuals are found within a treatment site while work is occurring, work shall stop until the individuals are no longer at risk of incidental injury or death from the implementation of the treatment or have left the treatment area without assistance.
  - Pond draining shall not occur during the breeding period for California tiger salamander or California red-legged frog (generally October 15 through May). In addition, prior to draining any pond, protocol surveys will be conducted by a qualified biologist. Draining of the pond shall only proceed once surveys confirm that no California tiger salamanders, California red-legged frogs, or egg masses are present.
- Prior to the use of herbicides, the Authority will conduct field surveys within treatment sites for the presence of suitable aquatic and upland habitat for California tiger salamander and California red-legged frog. If suitable aquatic or upland habitat is identified, the Authority will implement the following measures:
  - No broadcast spraying of herbicides will occur within 50 feet of suitable California tiger salamander or California red-legged frog aquatic habitat and no application of herbicides by any method will occur within 15 feet of California tiger salamander or California red-legged frog aquatic habitat.
  - Within 50 feet of suitable California tiger salamander or California red-legged frog upland habitat, no broadcast spraying of herbicides (i.e., boom on an ATV) will occur during the wet season (generally October

15 through May), or within 24 hours of rainfall, to avoid direct exposure to California tiger salamander or California red-legged frog. Targeted, handheld application of herbicides may occur outside of this window within 50 feet of California red-legged frog upland habitat or California tiger salamander upland habitat by staff trained to identify and avoid any potential burrows and burrow openings.

- When using herbicides that contain the active ingredients that are subject to the herbicide injunction for California red-legged frog (Center for Biological Diversity v. U.S. Environmental Protection Agency [2006] Case No.: 02-1580-JSW) the requirements of that injunction shall apply (see EPM BIO-8).
- Alternatively, if it is not feasible to meet the objectives of the IPM Program under these requirements for herbicide use, the Authority will consult USFWS and/or CDFW before implementation of herbicide application to develop measures to avoid the injury, death, or disturbance of California tiger salamander and California red-legged frog. These measures may include, but are not limited to, limitations on the types of herbicides used and restrictions on the timing of use. If agreement is reached, the Authority shall implement all measures developed in consultation with the agencies.

Mitigation Measure 3.3-2e: Avoid Impacts to Foothill Yellow-Legged Frog

- the Authority will obtain take coverage for foothill yellow-legged frog for all IPM activities under the Habitat Plan (all activities including chemical treatments are covered by the Habitat Plan for foothill yellow-legged frog). The Authority will implement all applicable permit conditions required by the Habitat Plan to avoid and minimize injury, death, disturbance, or habitat degradation for this special-status species. If take coverage is not obtained, the Authority will implement the following the following measures:
  - Conduct field surveys within treatment sites for the presence of suitable foothill yellow-legged frog habitat.
  - The Authority will not broadcast spray herbicides within 50 feet of suitable aquatic or upland habitat and no application of herbicides by any method will occur within 15 feet of suitable aquatic habitat of foothill yellow-legged frog. Alternatively, if it is not feasible to meet the objectives of the IPM Program under these requirements for herbicide use, the Authority will consult CDFW to develop measures to avoid incidental injury or death of the species. These measures may include but are not limited to, limitations on the types of herbicides used and timing of use. If agreement is reached, the Authority shall implement all measures developed in consultation with CDFW.
  - Prior to conducting IPM treatments in foothill yellow-legged frog suitable habitat that could result in incidental injury or death of individuals as determined by a qualified biologist (e.g., mechanical treatments that use large, ground disturbing equipment such as tractor-operated mowers), and within 14 days of treatment, pre-treatment clearance surveys shall be conducted. If individuals are found within a treatment site during pre-treatment surveys, monitoring shall be conducted during treatment. If foothill yellow-legged frogs are found within a treatment site while work is occurring, work shall stop until the individual is no longer at risk of incidental injury or death from the implementation of the treatment, or until the individual is moved outside of the treatment site by a qualified biologist.

Mitigation Measure 3.3-2f: Preconstruction Surveys and Avoidance of California Giant Salamander, Coast Range Newt, and Santa Cruz Black Salamander

- Prior to conducting IPM treatments in California giant salamander, coast range newt, and Santa Cruz black salamander suitable habitat that could result in incidental injury or death of individuals (e.g., mechanical treatments that use large, ground disturbing equipment such as tractor-operated mowers) as determined by a qualified biologist, and within 14 days of treatment, pre-treatment clearance surveys shall be conducted.
- If individuals of these species are found within a treatment site during pre-treatment clearance surveys, monitoring shall be conducted during treatment. If California giant salamander, coast range newt, or Santa Cruz black salamander are found within the treatment site while work is occurring, work shall stop until the individual is no longer at risk of incidental injury or death from the implementation of the treatment, or until the individual is moved outside of the treatment site by a qualified biologist.

Mitigation Measure 3.3-2g: Avoid Impacts from Aquatic-based IPM Treatments to Special Status Amphibians

- Exclusion fencing, trapping, gigging, shooting, and electroshocking in aquatic environments shall be conducted by a qualified biologist with experience in the identification of amphibian species and possessing the appropriate federal and state permits to handle listed species. Inadvertently trapped or shocked special-status amphibians will be released immediately upon discovery.

<u>Significance after Mitigation</u>

Implementation of Mitigation Measures 3.3-2d through 3.3-2f would minimize effects on special-status amphibians by avoiding impacts from chemical treatments; obtaining take coverage under the Habitat Plan for covered species and activities and following all permit requirements to minimize impacts to covered special-status amphibians; implementing measures (e.g., surveys, seasonal restrictions, and monitoring) to avoid and minimize impacts if take coverage under the Habitat Plan is not obtained; and monitoring treatments in occupied habitat to avoid harm to individuals. In addition, only a qualified biologist will conduct animal pest removal in aquatic environments. Therefore, Mitigation Measures 3.3-2d through 3.3-2f would reduce the impacts to special-status amphibians and critical habitat to **less than significant after mitigation**.

Special-Status Reptiles

There are several special-status reptiles that are known to occur or could occur on one or more preserves within the IPM Program Area (refer to Appendix C, "Special-Status Species"). These special-status reptiles are Alameda whipsnake (*Masticophis lateralis euryxanthus*) (listed under ESA), coast horned lizard (*Phrynosoma blainvillii*), Northern California legless lizard (*Anniella pulchra*), and western pond turtle (*Actinemys marmorata*) (all CDFW species of special concern).

<u>Structures and Buildings</u>

Implementation of the IPM Program within structures and buildings would not result in any adverse effects on special-status reptile habitat, because no suitable habitat exists within these areas. If structures and buildings are located within suitable habitat, then the ripping of ground squirrel burrows adjacent to buildings and structures could affect special-status reptiles, particularly if occupied by special-status reptiles. In addition, should the ripping of ground squirrel burrows occur near aquatic habitat for western pond turtle, runoff of sediments could degrade water quality. However, EPM BIO-1 requires pre-treatment surveys for aquatic resources, prohibits ground disturbing mechanical treatments and all chemical treatments within 15 feet of aquatic resources, and prohibits the broadcast spraying of herbicides within 50 feet of aquatic features (unless the compound is specifically registered for aquatic use). This EPM would minimize impacts to aquatic habitat; however, individual special-status reptiles could be harmed if present during ripping of burrows.

<u>Recreation Facilities and Natural Lands</u>

IPM Program treatment activities would occur within recreational facilities and natural lands that may provide upland habitat for special-status reptiles. Manual, mechanical, and chemical treatment activities for invasive plant control are not likely to have a substantial adverse effect on the suitability of upland habitat for special-status reptiles due to the size of treatment areas relative to available habitat for these species within the IPM Program Area. IPM treatment activities such as tree removal, grubbing/scraping, mechanical equipment use, and use of spray pesticides could result in direct injury or mortality of special-status reptiles if conducted in upland habitat or indirect injury or mortality to western pond turtle if conducted near aquatic habitat due to potential water quality degradation. In addition, trapping, gigging, shooting, and electroshocking within suitable aquatic habitat could result in the incidental injury or death of western pond turtle, if present. However, the Authority would implement several EPMs which would reduce potential impacts to special-status reptiles. The Authority would follow specific methods for handling of all pesticides to minimize spills (EPM HAZ-4); follow specific guidelines regarding pesticide use to minimize potential drift and off-site runoff (EPM HAZ-5); and the Authority would conduct pre-treatment surveys for aquatic resources, prohibit ground disturbing mechanical treatments and all chemical treatments within 15 feet of any aquatic features, and prohibit broadcast spraying of herbicides within 50 feet of aquatic habitat (unless the compound is specifically registered for aquatic use) (EPM BIO-1). Implementation of these EPMs would minimize the likelihood of indirect effects to special-status reptile aquatic habitat from IPM treatment activities; however, there is a potential for impacts to special-status reptiles in upland habitats from all treatment activities and from trapping, gigging, shooting, and electroshocking within suitable aquatic habitat.

Agricultural Lands

While special-status reptiles are not anticipated to occur on agricultural lands within the IPM Program Area, western pond turtle may be present on the margins of agricultural lands within approximately 0.3 mile of suitable aquatic habitat. Mechanical IPM treatment activities and rodent burrow removal could result in indirect injury or mortality to western pond turtle if conducted near aquatic habitat due to potential water quality degradation. However, as previously described, EPM BIO-1 requires pre-treatment surveys for aquatic resources, prohibits ground disturbing mechanical treatments and all chemical treatments within 15 feet of aquatic resources, and prohibits the broadcast spraying of herbicides within 50 feet of aquatic features (unless the compound is specifically registered for aquatic use). These restrictions would minimize the potential for indirect impacts to western pond turtle habitat. While unlikely, mechanical treatments could result in disturbance to western pond turtle nests and associated incidental injury or death of individuals could occur if present during treatments.

Special-Status Reptile Impact Summary

Implementation of the IPM Program within structures and buildings would not result in substantial adverse effects on special-status reptiles due to a lack of suitable habitat in those areas. However, the ~~ripping of ground squirrel~~ removal of rodent burrows adjacent to structures and buildings could result in incidental injury or death of special status reptiles. Trapping, gigging, shooting, electroshocking, manual, mechanical, and chemical treatments within recreational and natural lands could result in incidental injury or death of special-status reptiles. Implementation of mechanical treatments under the IPM Program within agricultural lands may result in the disturbance of nests and incidental injury or death of individuals is present when treatments occur. Therefore, the impacts to special-status reptiles would be **potentially significant**.

Mitigation 3.3-2h: Avoid Injury or Loss of Special-Status Reptiles

- The Authority will obtain take coverage for western pond turtle under the Habitat Plan. The Authority will implement all applicable permit conditions that may be required by the Habitat Plan to avoid and minimize impacts to western pond turtle.
- For special-status reptiles that are not covered by the Habitat Plan (and for western pond turtle if Habitat Plan take coverage is not obtained), the Authority will implement the following avoidance and minimization measures prior to conducting IPM treatment activities that have the potential to injure or harm special-status reptiles:
  - Conduct assessment of treatment sites for the presence of suitable special-status reptile habitat. Prior to scraping/grubbing, ripping, rodent burrow removal, mechanical treatments, or tree removal within suitable habitat for special-status reptiles, and within 30 days of treatment, the Authority will survey the treatment site for the presence of special-status reptiles (and western pond turtle nests, if applicable). If special-status reptiles are found within the treatment site, monitoring for special-status reptiles will be conducted during the treatment and work will stop if a special-status reptile is at risk of injury until it is no longer at risk. Special-status reptiles (except for Alameda whipsnake) may be moved outside of the treatment area by a qualified biologist. Any western pond turtle nests will be flagged and avoided (if applicable).
  - Prior to conducting IPM treatment activities within occupied habitat for Alameda whipsnake, the Authority shall consult USFWS on any activities that may result in injury, death, or disturbance of the species to develop measures to avoid these impacts. Additional measures may include but are not limited to surveys, monitoring, and seasonal restrictions on use of pesticides and other treatments. If avoidance is not feasible then the Authority will not conduct IPM treatment activities that would cause impacts to Alameda whipsnake.
  - Shooting, trapping, gigging, and electroshocking of aquatic species, and trapping of rattlesnakes, will be conducted by a qualified biologist with experience in the identification of special-status reptile species. Inadvertently trapped special-status reptiles will be released immediately upon discovery. Trapping for rattlesnakes shall not be conducted within the range of Alameda whipsnake.

Significance after Mitigation

The implementation of Mitigation Measure 3.3-2h would avoid and minimize adverse effects on special-status reptiles by requiring surveys in suitable habitat, monitoring during treatment activities, work stoppage if individuals are present, and requiring qualified biologists with experience in identifying special-status reptiles to perform shooting, trapping, gigging, and electroshocking treatments. In addition, if the Authority does not obtain take coverage under the Habitat Plan for western pond turtle prior to implementing treatments that have the potential to harm them, the Authority would implement specific measures to minimize impacts on western pond turtle and their nests. Therefore, the impact to special-status reptiles would be **less than significant after mitigation**.

Special-Status Birds and Nests of Common Birds and Raptors

Special-status birds that could occur or are known to occur within the IPM Program Area are the ESA and CESA listed least Bell's vireo (*Vireo bellii pusillus*); the CESA listed bank swallow (*Riparia riparia*), Swainson's hawk (*Buteo swainsoni*), and tricolored blackbird (*Agelaius tricolor*); CDFW fully protected American peregrine falcon (*Falco peregrinus anatum*), bald eagle (*Haliaeetus leucocephalus*), golden eagle (*Aquila chrysaetos*), and white-tailed kite (*Elanus leucurus*); and the CDFW species of special concern burrowing owl (*Athene cunicularia*), grasshopper sparrow (*Ammodramus savannarum*), loggerhead shrike (*Lanius ludovicianus*), purple martin (*Progne subis*), and yellow-breasted chat (*Icteria virens*). The IPM Program Area includes nesting and foraging habitat for all of these species with the exception of American peregrine falcon, for which foraging habitat is present but not the cliffs and tall buildings required for nesting. Therefore, impacts to nests of American peregrine falcon from IPM program implementation are not anticipated.

Common birds and raptors are not special-status birds by definition; however, the nests of all raptors and common nesting birds are protected by Section 3503 and Section 3503.5 of the Fish and Game Code which makes it unlawful to take, possess, or needlessly destroy the nest or eggs of any common bird and to take, possess, or destroy raptors including their nests or eggs. The potential for IPM activities to adversely affect the nests of common bird species (including raptors) would be similar to the potential to adversely affect the nests of special-status birds; therefore, these species are analyzed together.

Structures and Buildings

Implementation of the IPM program within or adjacent to structures and buildings would not result in any adverse effects on special-status birds, because no suitable habitat exists within structures and buildings, and there is unlikely to be suitable nesting habitat adjacent to structures and buildings where ground squirrel control would be implemented. While structures and buildings may provide nesting habitat for certain common bird species (e.g., barn swallow (*Hirundo rustica*), nest removal would not occur under the IPM Program. In addition, the IPM Program is expected to increase treatment activities by a few additional treatment projects, which would not result in a substantial change to the existing activities that occur in and around structures and buildings. For these reasons, it is unlikely that treatment activities under the IPM Program would disturb common bird nests.

Recreation Facilities, Agricultural Lands, and Natural Lands

IPM Program treatment activities would occur within recreational facilities, agricultural lands, and natural lands that may provide suitable habitat for special-status birds (except for American peregrine falcon as noted above). In general, manual, mechanical, and chemical treatment activities for invasive plant control are not likely to have a substantial effect on the suitability of foraging or nesting habitat for special-status birds due to the size of treatment areas relative to available habitat for these species within the IPM Program Area. However, Himalayan blackberry (*Rubus armeniacus*) is identified as a target invasive species in the IPM Manual, which provides habitat for tricolored blackbird nesting colonies. Removal of Himalayan blackberry thickets that are documented to provide habitat for tricolored blackbird colonies could adversely affect the species. In addition, vegetation treatments such as cutting/mowing, grubbing/clearing, herbicide application, and tree removal may result in loss of nests through direct removal or disturbance. Activities such as trapping, gigging, shooting, and electroshocking to control bullfrogs, and invasive fish may also result in the disturbance of nests. Lastly, the trapping of brown-headed cow birds on natural lands may result in the unintentional capture and injury of special-status birds.

The Authority would implement EPMs to reduce adverse effects on nesting and special-status birds. EPM BIO-6 requires that invasive plant removal be conducted outside of bird nesting season (February 1 – August 31) if activities may adversely affect native bird nests. In the event that vegetation removal must occur during nesting bird season, EPM BIO-7 requires a nesting bird survey within 14 days of treatment that encompasses the area within a 250-foot radius for raptors, and a 50-foot-radius for other birds. If nesting birds are identified, work within these buffer areas will be postponed until the young have fledged or the nest is otherwise abandoned.

Special-Status Birds and Nests of Common Birds and Raptors Impact Summary

Implementation of the IPM Program within structures and buildings would not result in substantial adverse effects on special-status birds due a lack of suitable habitat in those areas. While structures and buildings may provide nesting habitat for common bird species, no nest removal or substantial disturbances would occur. Implementation of the IPM Program within recreation facilities, agricultural lands, and natural lands may result in the removal or disturbance of special-status birds or common bird nests (including raptors). EPMs would reduce the potential impacts by limiting treatments to outside of bird nesting season and requiring nest surveys and buffers be placed around nests to avoid disturbance. However, while sufficient to avoid substantial adverse effects on common raptors, other common nesting birds, and most special-status bird species, the buffers outlined EPM BIO-7 do not meet CDFW and/or USFWS standards for avoiding impacts to the nests of Swainson's hawk (CDFW 1994), burrowing owl (CDFW 2012), or least Bell's vireo. In addition, the EPMs would not prevent the loss of habitat where tricolor blackbird colonies are known to occur. Furthermore, brown-headed cowbird trapping could result in the incidental injury or death of special-status birds. Therefore, impacts to special-status birds would be **potentially significant**.

Mitigation 3.3-2i: Avoid Loss of Special-Status Birds, Nests, and Nesting Colonies

- The Authority will obtain take coverage for least Bell's vireo under the Habitat Plan for covered activities (i.e., manual and mechanical treatments). The Authority will implement all applicable permit conditions that may be required by the Habitat Plan to avoid and minimize impacts to least Bell's vireo. In occupied habitat for least Bell's vireo (or in suitable habitat if occupancy is not known), the Authority will not use chemical treatments without prior consultation with USFWS.
- The Authority will obtain take coverage for tricolored blackbird and burrowing owl under the Habitat Plan. The Authority will implement all applicable permit conditions required by the Habitat Plan.
- If take coverage under the Habitat Plan is not obtained for covered special-status birds before covered activities are implemented, the Authority will implement the following avoidance and minimization measures:
  - Treatment activities within 250 feet of riparian habitat suitable for least Bell's vireo nesting will occur outside of the least Bell's vireo breeding season (defined as March 15 through September 15) to the extent feasible. If work must occur within 250 feet of riparian habitat within the breeding season, a qualified biologist will conduct visual and audio surveys for nesting least Bell's vireo according to the Least Bell's Vireo Survey Guidelines (USFWS 2001) or as approved by USFWS. Vocalization recordings will not be used. In the event that least Bell's vireo territory or active nests are confirmed during the surveys, the biologist will establish an avoidance buffer zone between the territory edge and investigation activities at a distance recommended by USFWS. The Authority will periodically monitor active territories and maintain the territory avoidance buffer zone until nestlings have fledged and are no longer reliant on the nest or parental care for survival or until the nest is abandoned (as determined by a qualified biologist).
  - Prior to conducting treatments in burrowing owl habitat, the Authority will conduct a survey of the treatment site for burrowing owl burrows. If an active burrow is identified near a treatment site and work cannot be conducted outside of the nesting season (February 1 to August 31), a qualified biologist will establish an avoidance buffer that extends 150 to 1,500 feet around the burrow, depending on nesting stage and level of disturbance. If burrowing owls are present at the treatment site during the non-breeding season (September 1 through January 31), a qualified biologist will establish an avoidance buffer that extends a minimum of 150 feet around the burrow.

- IPM Program activities that occur within 250 feet of suitable tricolored blackbird nesting colony habitat will be conducted outside of the breeding season (March 15 through September 31). If work must occur within 250 feet of suitable tricolored blackbird nesting colony habitat during breeding season, then a protocol survey for tricolored blackbird nests will be conducted. If a nesting colony is present, then no IPM activities will occur within 250 feet of the colony until the colony has dispersed. Vegetation that has been documented to be used for nesting by tricolored blackbird shall not be removed for a period of 5-years following the use of the vegetation for nesting.

- Within Swainson's hawk nesting habitat, the Authority will survey for active nests prior to the implementation of any IPM Program activities. If nests are identified, IPM Program activities would be prohibited within 0.25 mile of the active nest during nesting season (March 1 - September 15). This buffer may be adjusted as appropriate by a qualified biologist in consultation with CDFW. If removal of a Swainson's hawk nest tree is required, the Authority shall conduct removal of the tree outside of the active nesting season in coordination with CDFW.
- For all other special-status bird species, the Authority will apply EPM BIO-6 and EPM BIO-7 to trapping, gigging, shooting, and electroshocking activities for bullfrog and invasive fish removal. This would require that trapping, gigging, shooting, and electroshocking activities for bull frog and invasive fish removal occur outside of the nesting season, or requires a nesting bird survey if activities would occur within the nesting season and non-disturbance buffers would be implemented.
- Brown-headed cowbird trapping shall be conducted by a qualified biologist with experience in the identification of bird species. Inadvertently trapped special-status birds will be released immediately upon discovery. Prior to initiating trapping, the Authority will consult CDFW and USFWS regarding trapping within 250 feet of special-status bird species habitat.

Significance after Mitigation

Implementation of Mitigation Measures 3.3-2i would avoid and minimize effects to special-status and common raptors and other nesting birds by prohibiting spraying of pesticides in occupied least bell's vireo habitat, requiring pre-treatment surveys, avoiding treatments during nesting season or establishing non-disturbance buffers during nesting season, and requiring qualified biologists to conduct brown-headed cowbird trapping in consultation with CDFW and USFWS when near special-status bird habitat. Therefore, the impact to special-status birds and common raptors and other nesting birds would be **less than significant after mitigation**.

San Joaquin Kitfox, Mountain Lion, Ringtail, and American Badger

The IPM Program Area contains suitable habitat for the ESA and CESA listed San Joaquin kitfox (*Vulpes macrotis mutica*), the CESA candidate threatened Southern California/Central Coast evolutionary significant unit of the mountain lion (*Puma concolor*), the CDFW fully protected ringtail (*Bassariscus astutus*), and CDFW species of special concern American badger (*Taxidea taxus*). These species are known to occur or are likely to occur within the IPM Program Area and may be affected by IPM Program activities.

Structures and Buildings

Implementation of the IPM program within and adjacent to structures and buildings would not result in any adverse effects on San Joaquin kitfox, ringtail, mountain lion, or American badger because no suitable habitat exists within structures and buildings and the level of disturbance adjacent to structures and buildings make denning for these species unlikely. Also, pesticides would be used in anchored traps within the structures and are not likely to produce secondary toxicity (refer to Appendix HAZ-1).

Recreation Facilities, Agricultural Lands, and Natural Lands

IPM Program activities would occur within recreational facilities, agricultural lands, and natural lands that provide habitat for San Joaquin kitfox and American badger, and recreational facilities and natural lands that provide habitat for ringtail and mountain lion. IPM Program treatment activities for invasive plant control are not likely to have a substantial adverse effect on the suitability of habitat for San Joaquin kitfox, mountain lion, ringtail, and American badger due to the small size of the areas that would be treated relative to the abundant available habitat for these species within the IPM Program Area. Additionally, implementation of the IPM Program would not convert natural habitat to development or other uses, or otherwise constrain the movement of these species. However, manual, mechanical, and chemical IPM treatments, such as spraying of herbicides, mowing, grubbing/clearing, rodent burrow removal, and tree removal may result in disturbance of San Joaquin kitfox, mountain lion, ringtail, and American badger dens if present. If disturbance of dens occurs during denning, this may result in incidental injury or death of young.

As described in Chapter 2, "Program Description," the Authority would consult with CDFW to develop a management plan for feral pigs that would reduce the likelihood of unintended trapping of San Joaquin kitfox, mountain lion, ringtail, or American badger. With CDFW consultation, the management plan for feral pigs is not likely to result in injury or death of these species. However, although the likelihood would be reduced with CDFW consultation, trapping of feral pets within recreational facilities could result in the unintended trapping of San Joaquin kitfox, mountain lion, ringtail, or American badger, which could result in incidental injury or death of individuals.

San Joaquin Kitfox, Mountain Lion, Ringtail, and American Badger Impact Summary

Implementation of the IPM Program within structures and buildings would not result in substantial adverse effects on San Joaquin kitfox, mountain lion, ringtail, and American badger due to a lack of suitable habitat and a lack of secondary toxicity of the pesticides used in these areas. Implementation of the IPM Program within recreation facilities, agricultural lands, and natural lands would not substantially reduce the suitability of habitat but may result in disturbance of dens that could result in loss of young. In addition, the trapping of feral pets could result in the incidental injury or death of San Joaquin kitfox, ringtail, mountain lion, and American badger. Therefore, the impact would be **potentially significant**.

Mitigation Measure 3.3-2j: Avoid Injury and Loss of San Joaquin Kitfox

- The Authority will obtain take coverage for San Joaquin kitfox under the Habitat Plan for covered activities (i.e., manual and mechanical treatments). The Authority will implement all applicable permit conditions required by the Habitat Plan.
- Prior to the application of pesticides within suitable habitat for San Joaquin kitfox, the Authority will consult with USFWS to determine the appropriate measures to avoid injury, death, or disturbance to the species due to pesticides. The Authority will implement all conservation measures developed with USFWS such as restrictions on pesticide use.
- If take coverage under the Habitat Plan is not obtained before IPM Program activities are implemented within suitable habitat for San Joaquin kitfox, the Authority will implement the following avoidance and minimization measures:
  - Prior to implementing IPM Program activities that could disturb San Joaquin kitfox dens, such as mowing, rodent burrow removal, grubbing/clearing, and tree removal within suitable habitat for San Joaquin kitfox, the Authority will survey for dens within a buffer of 200 feet around treatment sites. If potential dens are found during surveys, a non-disturbance buffer of not less than 100 feet will be maintained around the den site for the duration of treatment activities. If a natal den is discovered within 200 feet of a treatment site, all activity shall cease, and the Authority will contact the USFWS and CDFW to consult about potential avoidance measures before activities can occur (USFWS 2011).
  - No trapping of feral pets would occur within suitable habitat for San Joaquin kitfox, unless the Authority conducts surveys and determines that the suitable habitat is unoccupied in consultation with USFWS.

Mitigation Measure 3.3-2k: Avoid Injury and Loss of American Badger and Ringtail

- No more than 14-days prior to implementation of IPM Program activities that could disturb American badger and ringtail dens, such as herbicide application, mowing, grubbing/clearing, rodent burrow removal, and tree removal within suitable habitat, a qualified biologist shall conduct pre-treatment surveys within 100 feet of treatment project sites for potential American badger and ringtail dens.

- If any potentially occupied American badger dens are located during surveys, no work shall be performed within a 50-foot buffer around each den during the non-breeding season or within a 100-foot buffer around dens during the period when pups are potentially in the den (February 15 through July 1).
- If any potentially occupied ringtail dens (e.g., brush piles, appropriately sized burrows, hollow logs, hollow trees) are located during surveys, the same buffers as described for American badger during non-breeding and breeding season (May 1 through June 30) shall be implemented.
- Feral pet trapping within suitable habitat for American badger shall be conducted by a qualified biologist with experience in the identification of American badger. Inadvertently trapped special-status species, including American Bader, will be released immediately upon discovery.
- Feral pet trapping within suitable habitat for ringtail shall be conducted by a qualified biologist with experience in the identification of ringtail. Inadvertently trapped special-status species, including ringtail, will be released immediately upon discovery. Prior to initiating trapping in suitable ringtail habitat, the Authority will consult CDFW to confirm trapping methods are sufficient in avoiding potential injury to ringtail.

Mitigation Measure 3.3-2l: Avoid Injury and Loss of Mountain Lion

- The Authority shall conduct desktop analyses (e.g., review of land cover, slope, distance from development), coordination with local experts studying or tracking the species (if available), and field habitat surveys to determine the presence of nursery habitat suitable for mountain lion within preserves where treatments may occur. The desktop analysis shall be updated as habitat conditions or species occurrence information changes.
- Where the desktop analysis determines that suitable nursery habitat is present, the Authority will conduct focused surveys of the treatment area and a 2,000-foot buffer for the presence of potential mountain lion nurseries. Surveys will be conducted within 7 days before commencement of treatment activities by a qualified wildlife biologist with familiarity with mountain lion and experience using survey methods for the species. Potential mountain lion dens will include caves, large natural cavities within rocky areas, or thickets deemed appropriate for use by mountain lions based on size and other characteristics (e.g., proximity to human development, surrounding habitat, and coordination with local experts to determine known locations of female mountain lions). The qualified wildlife biologist will survey for signs of mountain lion (e.g., tracks, scat, prey items such as a fresh kill) in the vicinity of potential nursery habitat to help determine whether the area may contain a mountain lion nursery. If signs of a mountain lion nursery are observed, further investigation will be required to determine if a mountain lion nursery is present (see below).
- If signs of a mountain lion nursery are found during surveys, further investigation will be required to determine if a mountain lion nursery is present. No treatment will occur in the area while further investigation is occurring. Survey methods will include the use of trail cameras, track plates, hair snares, and/or other noninvasive methods, as well as coordination with local experts tracking the species (if available). Surveys using these noninvasive methods will be conducted for three days and three nights to determine whether a nursery may be present.
- If a nursery is known to occur in the area or further signs of a nursery are detected (e.g., lactating adult females or kittens on camera, repeated detections of an adult female in the area, growls or calls from kittens), the Authority will implement a no-disturbance buffer of at least 2,000 feet (Wilmers et al. 2013) for a minimum of 10 weeks. Treatment activities will not occur within this buffer during this time to avoid disturbance, injury, or mortality of mountain lion.
- Feral pet trapping within suitable habitat for mountain lion shall be conducted by a qualified biologist with experience in the identification of mountain lion cubs. Inadvertently trapped special-status species, including mountain lion individuals, will be released immediately upon discovery. Prior to initiating trapping in suitable mountain lion habitat, the Authority will consult CDFW to confirm trapping methods are sufficient in avoiding potential injury to mountain lion individuals.

Significance after Mitigation

Mitigation Measures 3.3-2j through 3.3-2l require the implementation of avoidance measures for San Joaquin kitfox, ringtail, mountain lion, and American badger, such as pre-treatment surveys and buffers around potentially occupied dens. Therefore, Mitigation Measures 3.3-2j through 3.3-2l would reduce the impact to San Joaquin kitfox, mountain lion, ringtail, and American badger to **less than significant after mitigation**.

San Francisco Dusky-Footed Woodrat

San Francisco dusky-footed woodrat is a CDFW species of special concern that in natural settings builds nests of sticks and other similar materials that may be used by multiple generations of woodrats. The species may also nest and cache food in buildings opportunistically where they can be considered pests.

Structures and Buildings

The IPM Program would target rodents that have occupied existing structures and buildings, including the San Francisco dusky-footed woodrat. Due to the relative abundance of suitable habitat within the IPM Program Area, excluding woodrats from Authority managed structures and buildings would not substantially affect the species.

The IPM Program includes the use of fumigants and rodenticides to treat insects and rodents within structures, and trapping of rodents, if necessary. If San Francisco dusky-footed woodrats are present in the structure at the time fumigation occurs, they would be exposed to the fumigant at high levels and may be injured or killed. In addition, the use of rodenticides would injure or kill San Francisco dusky-footed woodrats that consume the compound or accidentally trapped woodrats may be injured or killed. The loss of individual woodrats within structures and buildings under the IPM Program would not be a substantial adverse effect on the species because the species has a high reproductive rate (2-3 pups per litter and up to 5 litters a year [CWHR 2008]) and the use of fumigation, trapping, and rodenticides would be limited and infrequent, which would minimize the number of woodrats affected.

As described in Chapter 2, "Program Description," the IPM Program also proposes to remove San Francisco dusky-footed woodrat nests that occur adjacent to buildings and structures if the nest is thought to be a constant source of infestation. This activity would only occur after consultation with CDFW and implementation of conservation measures required by CDFW, such as live capture and relocation of woodrats to suitable adjacent habitats and the dismantling of nests by hand under the supervision of a biologist. Because any nest removal would be required to implement conservation measures as directed by CDFW, the removal of nests would not substantially affect the species.

Recreation Facilities, Agricultural Lands, and Natural Lands

IPM Program treatment activities would occur within recreational facilities and natural lands that may provide suitable habitat for San Francisco dusky-footed woodrat. The unmaintained margins of agricultural lands may also provide marginal habitat for woodrats, and San Francisco dusky-footed woodrats could be caught in rodent traps on agricultural lands. However, live trapping of rodents on agricultural lands would not target San Francisco dusky-footed woodrats, and if they are incidentally captured, they would be released. As a result, loss of individuals would be rare and would not substantially affect the species. In addition, IPM Program treatment activities for invasive plant control are not likely to have a substantial adverse effect on the suitability of habitat for San Francisco dusky-footed woodrat due to the abundance of available habitat for the species within the IPM Program Area.

Mechanical vegetation treatments, such as mowing/cutting and tree removal within suitable habitat may result in inadvertent removal of San Francisco dusky-footed nests. San Francisco dusky-footed woodrat nests may be reused by multiple generations and competition for existing nests may be substantial (CWHR 2008). Woodrat nests are assumed to be limited in number and the removal of nests could adversely affect the species.

San Francisco Dusky-Footed Woodrat Impact Summary

The use of fumigation and rodenticides to control pest infestations within buildings and structures is not anticipated to result in substantial effects on San Francisco dusky-footed woodrat due the limited application of these compounds and the high reproductive rate of the species. However, implementation of mechanical treatments in recreational facilities, agricultural lands, and natural lands may result the inadvertent destruction of San Francisco dusky-footed woodrat nests. Therefore, the impact would be **potentially significant**.

Mitigation 3.3-2m: Minimize Loss of San Francisco Dusky-Footed Woodrat Nests

- The Authority will survey for the presence of San Francisco dusky-footed woodrat nests within areas proposed for mechanical vegetation removal. The locations of nests shall be recorded, and nests flagged for avoidance by treatment activities.
- The Authority will consult with CDFW in areas where ~~vegetation~~ treatments would result in destruction or removal of a nest. Management actions shall be determined in consultation with CDFW and may include the live capture and relocation of woodrats to suitable adjacent habitats and the dismantling of nests. If consultation determines that nest dismantling may occur, nests shall be dismantled by hand under the supervision of a biologist. If young are encountered during the dismantling process, the material shall be placed back on the nest, and the nest shall remain undisturbed for two to three weeks to give the young enough time to mature and leave the nest on their own accord. After two to three weeks, the empty nest may be dismantled. Nest material shall be moved to suitable adjacent areas within suitable habitat that shall not be disturbed. As woodrats exhibit high site fidelity, buildings with previous woodrat nests shall be regularly inspected for potential intrusion to prevent infestation.

Significance after Mitigation

The implementation of Mitigation Measure 3.3-2m would avoid adverse effects on San Francisco dusky-footed woodrat from the implementation of mechanical vegetation removal under the IPM Program by conducting surveys for woodrat nests prior to treatments, flagging nests, and avoiding nests when present in a treatment project site. Therefore, the impact to San Francisco dusky-footed woodrat would be **less than significant after mitigation**.

Special-Status Bats

There are several special-status bat species that may roost in the IPM Program Area. The hoary bat (*Lasiurus cinereus*) is a Western Bat Working Group medium priority species that roosts in the foliage of large trees. The long-eared myotis (*Myotis evotis*) is also a Western Bat Working Group medium priority species and may roost in building and structures, or large trees and snags within the IPM Program Area. The pallid bat (*Antrozous pallidus*) and Townsend's big-eared bat (*Corynorhinus townsendii*) are CDFW species of special concern that may also roost in buildings and structures within the IPM Program Area, although Townsend's big-eared bat and pallid bat are highly sensitive to disturbance and unlikely to roost in buildings that are actively used by the Authority.

Structures and Buildings

The IPM Program would target bats in structures and buildings where there is a potential threat to human health or safety. As described in the IPM Manual (Appendix B), the Authority would modify buildings to exclude bat entries and screen potential bat roosting areas, and the Authority would install one-way door to allow bats to escape but not enter after exclusionary methods are completed; and no trapping or chemical control techniques would be used. Furthermore, it is unlikely that special-status bats would use Authority structures and buildings due to existing human presence. In addition, habitat other than structures and buildings (e.g., large trees) is available for hoary bat and long-eared myotis within the IPM Program Area. However, if an active nursery roost is present in a structure or building when work is performed to exclude bats, this could result in loss of young special-status bats. The IPM Program also includes the use of fumigation to treat insects within structures, when necessary. If an active nursery roost is present in a structure or building when fumigation occurs, special-status bats and young would be exposed to the fumigant at high levels and may be injured or killed.

Recreation Facilities, Agricultural Lands, and Natural Lands

IPM Program treatment activities on recreational facilities, agricultural lands, and natural lands are not likely to have a substantial adverse effect on the suitability of foraging or roosting habitat for special-status bats due to the quantity of available habitat for these species within the IPM Program Area. However, tree removal that is undertaken within recreational facilities as part of the IPM Program may result in the inadvertent destruction of active roosts of hoary bat and long-eared myotis. If an active roost is present when tree removal work is performed, this would likely result in loss of special-status bat adults and young.

Special-Status Bats Impact Summary

IPM Program treatment activities on natural and agricultural lands are not anticipated to substantially effect special-status bats or suitable habitat. However, the use of fumigation and exclusion techniques for bats within structures and buildings, and tree removal within recreational facilities during the nursery season may result in loss of active nursery roosts, which would be a **potentially significant** impact.

Mitigation 3.3-2n: Avoid Loss of Special-Status Bat Roosts

- If exclusion of bats or fumigation is necessary in buildings and structures during the nursery season (April through August), a qualified biologist will conduct surveys for roosting bats. Surveys shall consist of daytime pedestrian surveys to look for visual signs of bats (e.g., guano), and if determined necessary, evening emergence surveys to note the presence or absence of bats. If evidence of bat roosting is found, the number and species of roosting bats will be determined. When special-status bat roosting sites are located in buildings, exclusion of bats and fumigation shall occur outside of the April through August nursery season.
- The Authority shall not remove trees greater than 16 inches diameter at breast height (dbh) during the April through August nursery season, unless a qualified biologist conducts surveys for roosting bats where suitable large trees are to be removed. Surveys will consist of daytime pedestrian surveys to look for visual signs of bats (e.g., guano), and if determined necessary, evening emergence surveys to note the presence or absence of bats. If evidence of special-status roosting bats is found, removal of trees where potential special-status bat roosts are identified shall occur outside of the nursery season. If no evidence of special-status bat roosts is found, then the Authority may move forward with tree removal.

Significance after Mitigation

The implementation of Mitigation Measure 3.3-2n would avoid adverse effects to special-status bats from the implementation of the IPM Program by conducting surveys for special-status bat roosts and restricting activities that would injure, kill, remove, or exclude bats from roosts during the nursery season. Therefore, the impact to special-status bats would be **less than significant after mitigation**.

Impact 3.3-3: Potential to Substantially Affect Riparian Habitat or Other Sensitive Natural Communities Identified by CDFW or USFWS

Implementation of the IPM Program may occur within or adjacent to riparian and other sensitive natural communities. However, manual and mechanical IPM Program treatments that would be implemented for the removal of invasive plants and animals would not substantially affect riparian habitat or other sensitive natural communities due the limited size and short duration of disturbances. These activities would not change the community type or habitat function of a community, and the areas that would be treated would not be so large such that a significant reduction in acreage of these communities would result. Furthermore, the Authority would implement EPMs that would prohibit ground disturbing mechanical treatments and all chemical treatments within 15 feet of aquatic resources, and prohibit the broadcast spraying of herbicides within 50 feet of aquatic features (unless the compound is specifically registered for aquatic use) (EPM BIO-1). this would reduce impacts where riparian vegetation is present. Also, measures minimizing the potential for herbicide drift or runoff into surrounding areas would be implemented (EPM HAZ-5), which would reduce the potential for herbicides to enter non-target areas such as riparian areas and other sensitive natural communities. Therefore, the impact would be **less than significant**.

Riparian habitat or other sensitive natural communities (Table 3.3-3) are present within natural lands and adjacent to structures and buildings, recreational facilities, and agricultural lands within the IPM Program Area. Vegetation removal and ground disturbing IPM activities could damage riparian habitat or other sensitive natural communities if present in a treatment area. However, manual, mechanical, and herbicide treatment activities for invasive plant control within sensitive natural communities would not have a substantial adverse effect, because the removal of invasive plants would not change the community type or habitat function of the community, and the small area of treatment would not result in a substantial reduction in acreage of these communities. Furthermore, invasive plant treatments under the IPM Program may result in habitat improvement within sensitive communities through the removal of invasive plants that compete with native vegetation for resources.

Implementation of invasive animal treatments such as trapping, ~~destroying ground squirrel~~ removing rodent burrows, gigging, and shooting may occur within other sensitive natural communities and could result in damage to the habitat through trampling, or in the case of rodent burrow ~~destruction~~ removal, through ground disturbance. However, the trampling of vegetation would be temporary, and the actual disturbance would be limited to the footprint of the traps and presence of staff. Rodent ~~B~~burrow ~~destruction~~ removal would be used as a last resort adjacent to structures and buildings and on agricultural lands to control problem squirrels and other rodents, and ground disturbance would be limited. Given the small footprints associated with these activities, invasive animal treatments would not change a community type or function or result in a substantial reduction in acreage of these communities.

Herbicide use adjacent to riparian habitat or other sensitive natural communities could also result in indirect effects on due to unintended off-site runoff or herbicide drift. However, the Authority would implement EPM BIO-1, which prohibits ground disturbing mechanical treatments and all chemical treatments within 15 feet of aquatic resources, and prohibits the broadcast spraying of herbicides within 50 feet of aquatic features (unless the compound is specifically registered for aquatic use); EPM HAZ-4, which requires specific methods for handling of all pesticides to minimize spills; and EPM HAZ-5, which includes specific weather parameters and other measures to avoid pesticide drift and runoff (i.e., restrictions related to wind speeds and precipitation). Therefore, implementation of the IPM Program would not have a substantial adverse effect on riparian habitat or other sensitive natural communities because sensitive community acreage and function would not be lost and EPMs would be implemented to avoid and minimize potential indirect effects from herbicide use. Therefore, the impact would be **less than significant**.

Impact 3.3-4: Potential to Substantially Affect State or Federally Protected Wetlands or Other Waters

IPM Program treatments that are conducted near aquatic resources may result in runoff of sediment and pesticides to potentially protected wetlands and other waters. In addition, aquatic invasive animal control under the IPM Program would result in temporary fill and dewatering of potentially protected state and federal wetlands and other waters. However, the Authority would implement EPMs that require pre-treatment surveys for aquatic resources, prohibit ground disturbing mechanical treatments or any chemical treatments within 15 feet of aquatic resources, and prohibit the broadcast spraying of herbicides within 50 feet of aquatic features (unless the compound is specifically registered for aquatic use) (EPM BIO-1); require specific methods for safe handling of all pesticides and to minimize accidental spills (EPM HAZ-4); and limit herbicide applications during high winds or precipitation to minimize the potential for herbicide drift or off-site runoff (EPM HAZ-5). These EPMs would minimize the potential for water quality effects from manual, mechanical, and chemical treatments and no substantial degradation would occur. In addition, prior to conducting aquatic invasive animal control, the Authority would obtain all necessary permits prior to conducting activities within any state or federally protected waters, including a Clean Water Act Section 404 permit and Section 401 water quality certification. For permitted activities occurring in protected waters, the Authority would be required to meet a standard of no net loss of amount or function of wetlands or other waters. Therefore, the IPM Program would not substantially affect protected wetlands or other waters and the impact would be **less than significant**.

IPM Program treatment activities could occur in the vicinity of wetlands and other waters, and aquatic invasive animal treatments, such as removing bullfrogs, exotic turtles, and non-native fishes would occur within waters that may be state or federally protected. Manual, mechanical, and herbicide treatment activities for invasive plant control and rodent burrow removal that occurs adjacent to state and federally protected waters could result in the runoff of sediment and herbicides or herbicide drift, which could reduce water quality. However, the Authority would implement EPM BIO-1, which requires pre-treatment surveys for aquatic resources, prohibits ground disturbing mechanical treatments or any chemical treatments within 15 feet of any aquatic features, and prohibits broadcast spraying of herbicides within 50 feet of aquatic features (unless the compound is specifically registered for aquatic use). In addition, EPM HAZ-4 requires specific methods for safe handling of all pesticides and to minimize accidental spills, and EPM HAZ-5 limits herbicide applications during high winds or precipitation to minimize the potential for herbicide drift or off-site runoff. These EPMs would minimize the potential for water quality effects from manual, mechanical, and chemical invasive plant treatment and no substantial degradation would occur.

Manual invasive animal removal such as trapping, gigging, and shooting may occur within federally protected wetlands or other waters; however, the adverse effects of these activities would be temporary, and fill would be limited to the footprint of the traps. The IPM Program may also seasonally drain stock ponds for bullfrog control. The ponds would not be permanently drained, and the process would not result in a loss of state or federally protected wetlands or waters. However, implementation of these treatments may result in the temporary fill or dewatering of state or federally protected wetlands and other waters. The Authority would obtain all necessary permits prior to conducting activities within any state or federally protected waters, including a Clean Water Act Section 404 permit and Section 401 water quality certification. For permitted activities occurring in protected waters, the Authority would be required to meet a standard of no net loss of amount or function of wetlands or other waters. Therefore, with implementation of EPMs and permitting requirements, the impacts to wetlands and waters would be **less than significant**.

Impact 3.3-5: Potential to Conflict with Local Policies or Ordinances Protecting Biological Resources

Portions of the IPM Program Area are within San Jose, Morgan Hill, and Santa Clara County and various policies and ordinances protection biological resources would apply to the IPM Program. The potential for adverse effects to special-status species, sensitive communities and riparian habitats, and protected waters are addressed in Impact 3.3-1, 3.3-2, and 3.3-3 respectively. Because the IPM Program would not result in any significant and unavoidable effects to any of these resources, it would be consistent with the protections required by each jurisdiction. Furthermore, although each jurisdiction has ordinances specific to tree removal because tree removal under the IPM Program would be limited to hazard trees on Authority-owned public lands, it would be exempt from the Santa Clara County tree ordinance, and the San Jose and Morgan Hill ordinances do not apply to public lands. For these reasons there would be no conflicts with local policies or ordinances protecting biological resources and the impact would be **less than significant**.

Portions of the IPM Program Area are within San Jose, Morgan Hill, and Santa Clara County and thus, relevant policies protecting biological resources would apply to the IPM Program. Each jurisdictions' general plan contains provisions for the protection of special-status species, sensitive communities and riparian habitats, and waters (refer to Section 3.3.1 above). The potential for adverse effects on these resources are addressed in Impact 3.3-1, 3.3-2, and 3.3-3 respectively. Because the IPM Program would not result in any significant and unavoidable effects to any of these resources, it would be consistent with the protections required by each jurisdiction.

Each jurisdiction also has specific policies related to tree removal that would apply to tree removal under the IPM Program. Section C16 of the Santa Clara County Ordinance Code defines a "protected tree" as a tree with a trunk diameter of 12 inches or more at 4.5 feet above ground level in certain areas of the County. In addition, all trees within County right-of-way require a permit for removal. Exceptions to the County permit process are provided for hazard trees. Within San Jose, a tree removal permit is required for removal of trees on private property, while Morgan Hill requires a permit for removal of trees on any city or private property. All trees proposed for removal under the IPM Program would be hazard trees (i.e., trees that present a fall hazards within public areas; are blocking roads, trail, or parking lots; or are otherwise hazardous to visitors, staff, or contractors) and are therefore exempt from the county's tree ordinance. In addition, hazard tree removal under the IPM Program would occur on lands owned by the Authority (i.e., public lands); therefore, the tree removal ordinances in the cities of San Jose and Morgan Hill would not apply. For these reasons, implementation of the IPM Program would not conflict with any local policies or ordinances and the impact would be **less than significant**.

Impact 3.3-6: Potential to Conflict with the Provisions of the Santa Clara Valley Habitat Plan

The IPM Program Area falls within the Plan Area for the Habitat Plan, which is a habitat conservation plan and a natural community conservation plan. The implementation of the IPM Program would not result in loss of open space or substantially adversely affect riparian or sensitive natural communities that would cause a conflict with the Habitat Plan. The EPMs and mitigation measures described throughout this section would minimize and avoid impacts to sensitive biological resources during IPM Program implementation. Furthermore, by maintaining open space preserves within the IPM Program Area, the Authority is conserving high quality habitat and natural ecosystems consistent with the objectives of the Habitat Plan. Therefore, IPM Program would not conflict with the provisions of the Habitat Plan and the impact would be **less than significant**.

The IPM Program Area falls within the Plan Area for the Habitat Plan, which is a habitat conservation plan and a natural community conservation plan (Santa Clara County et al. 2012). Preserves within the IPM Program Area provide habitat for species covered by the Habitat Plan, and the Coyote Ridge Open Space Preserve is part of the reserve system for the Habitat Plan. The objectives of the Habitat Plan include providing comprehensive species, natural community, landscape, and ecosystem conservation in the Plan Area; contributing to the recovery of endangered species; protecting and enhancing biological and ecological diversity; establishing a regional system of habitat reserves to preserve, enhance, restore, manage, and monitor native species and the habitats and ecosystems upon which they depend; and enhancing and restoring stream and riparian systems for native fish and other species (Santa Clara County et al. 2012).

Implementation of the IPM Program would not result in a reduction of open space preserves or interfere with the establishment of habitat reserves, because no development or permanent conversion of open space to other uses would occur. Furthermore, the IPM Program is intended to comprehensively direct pest management strategies within the IPM Program Area that are effective in controlling the target pests, while also being cost-effective, safe for human health, and protective of natural resources including native species, special-status species, and water quality. In addition, the EPMs that would be implemented as part of the IPM Program together with the mitigation measures described throughout this section would avoid and minimize adverse effects to sensitive and protected biological resources, including endangered species. Lastly, by maintaining open space preserves within the IPM Program Area, the Authority is conserving high quality habitat and natural ecosystems consistent with the objectives of the Habitat Plan. For these reasons, implementation of the IPM Program would not conflict with the provisions of the Habitat Plan and the impact would be **less than significant**.

3.4 HAZARDS AND HAZARDOUS MATERIALS

This section describes and evaluates the potential health, safety, and environmental impacts related to hazards and hazardous materials that could result from IPM Program implementation. This section describes existing hazards and safety concerns within the IPM Program Area and the nature of potential impacts that could occur as a result of the proposed IPM treatments. The evaluation of the pesticides proposed for use is based, in part, on the Technical Pesticide Toxicity Evaluation, which is included as Appendix HAZ-1 of this PEIR.

Public comments on the Notice of Preparation related to hazards and hazardous materials included concern over the use of pesticides and keeping the public informed of treatment strategies, upcoming projects, and public health protection measures. Evaluation of the use of pesticides under the IPM Program and associated environmental protection measures (EPMs) are provided in Section 3.4.3, "Environmental Impacts and Mitigation Measures." As discussed in Section 2.5, "Objectives of the IPM Program," one of the main objectives of the IPM Program is to keep the interested public informed about treatment strategies, upcoming projects, and environmental and public health protection measures. EPMs that have been incorporated into the IPM Program specific to hazardous materials and protecting public health and safety are described in Section 2.9, "Environmental Protection Measures," of this PEIR.

3.4.1 Regulatory Setting

FEDERAL

Various federal laws address the proper handling, use, storage, and disposal of hazardous materials, as well as require measures to prevent or mitigate injury to health and the environment released. The U.S. Environmental Protection Agency (EPA) is the agency primarily responsible for enforcement and implementation of federal laws and regulations pertaining to hazardous materials. Applicable federal regulations pertaining to hazardous materials are contained mainly in Code of Federal Regulations (CFR) Titles 29, 40, and 49. Hazardous materials, as defined in the CFR, are listed in 49 CFR 172.101. Management of hazardous materials is governed by the following laws:

- The Resource Conservation and Recovery Act of 1976 (42 USC 6901 et seq.)
- The Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (also called the Superfund Act or CERCLA) (42 USC 9601 et seq.).
- The Superfund Amendments and Reauthorization Act of 1986 (Public Law 99-499; USC Title 42, Chapter 116)

These laws and associated regulations include specific requirements for facilities that generate, use, store, treat, and/or dispose of hazardous materials, which are applicable primarily to the Authority's use of pesticides. These regulations, and others related to hazardous materials, are discussed in more detail below.

Resource Conservation and Recovery Act

The Resource Conservation and Recovery Act (RCRA) establishes a framework for national programs to achieve environmentally sound management of both hazardous and non-hazardous wastes. RCRA was designed to protect human health and the environment, reduce/eliminate the generation of hazardous waste, and conserve energy and natural resources. RCRA also promotes resource recovery techniques. A waste would legally be considered hazardous if it is classified as ignitable, corrosive, reactive, or toxic. Under RCRA, EPA regulates hazardous waste from the time that the waste is generated until its final disposal ("cradle to grave"). The Hazardous and Solid Waste Amendments of 1984 both expanded the scope of RCRA and increased the level of detail in many of its provisions. The Hazardous Waste Management subchapter of the RCRA deals with a variety of issues regarding the management of hazardous materials, including the export of hazardous waste, state programs, inspections of hazardous waste disposal facilities, enforcement, and the identification and listing of hazardous waste. Under RCRA regulations, commercial chemical products such as pesticides would become "solid wastes" (and thus, potentially, hazardous wastes) at the point where a project proponent decides to discard them, if the pesticide product is listed in 40 CFR 261.31 or 261.33, or exhibits a hazardous waste characteristic identified in 40 CFR 261.21 through 261.24 (Cornell University 2017).

Comprehensive Environmental Response, Compensation, and Liability Act and Superfund Amendments and Reauthorization Act

Hazardous substances are a subclass of hazardous materials. They are regulated under the CERCLA and SARA. Under CERCLA, EPA has authority to seek out the parties responsible for releases of hazardous substances and ensure their cooperation in site remediation. CERCLA also provides federal funding (the "Superfund") for remediation. SARA Title III, the Emergency Planning and Community Right-to-Know Act (EPCRA), requires companies to declare potential toxic hazards to ensure that local communities plan ahead for chemical emergencies. EPA maintains a National Priority List of uncontrolled or abandoned hazardous waste sites identified for priority remediation under the Superfund program. EPA also maintains the Comprehensive Environmental Response, Compensation, and Liability Information System database that contains information on hazardous waste sites, potentially hazardous waste sites, and remedial activities across the nation.

For releases of hazardous substances, the federal government has established Superfund Reportable Quantities (RQs). CERCLA would apply to the IPM Program if a hazardous materials release were to occur during treatment activities above an established RQ for the substance.

Occupational Safety and Health Act of 1970

Enacted in 1970, the Occupational Safety and Health Act established the federal Occupational Safety and Health Administration (OSHA) to ensure healthy working conditions in the U.S. There are approximately 2,100 OSHA inspectors, who, along with other experts and support staff, establish and enforce protective standards in the workplace. California, under an agreement with OSHA, operates an occupational safety and health program in accordance with Section 18 of the Occupational Safety and Health Act of 1970. The program applies to all public and private sector places of employment in the State, with the exception of federal employees, the U.S. Postal Service, private sector employers on Native American lands, maritime activities on the navigable waterways of the U.S., private contractors working on land designated as exclusive Federal jurisdiction, and employers that require Federal security clearances.

The OSHA Hazard Communication Standard (29 CFR Section 1910.1200) requires that workers be informed of the hazards associated with the materials they handle. For instance, manufacturers must appropriately label containers, Material Safety Data Sheets must be available in the workplace, and employers must properly train workers. Workers at hazardous waste sites must receive specialized training and medical supervision according to the Hazardous Waste Operations and Emergency Response (HAZWOPER) regulations (29 CFR Section 1910.120).

Implementation IPM treatment activities under the IPM Program would require compliance with these federal and State safety standards and practices regarding workplace safety and providing a safe and healthy environment for workers.

Federal Insecticide, Fungicide, and Rodenticides Act

The Federal Insecticide, Fungicide, and Rodenticides Act (FIFRA) provides the basis for regulation, sale, distribution, and use of pesticides in the United States. FIFRA authorizes EPA to review and register pesticides for specified uses. EPA also has the authority to suspend or cancel the registration of a pesticide if subsequent information shows that continued use would pose unreasonable risks. FIFRA has been amended by the Pesticide Registration Improvement Act of 2003, which provides for the enhanced review of covered pesticide products, to authorize fees for certain pesticide products, and to extend and improve the collection of maintenance fees.

As a part of the federal registration process, EPA classifies each pesticide product as a "general use pesticide" or "restricted use pesticide" (RUP) based on the potential for the product to cause unreasonable adverse effects on human health or the environment. Only certified pesticide applicators or those under the supervision of a certified pesticide applicator may use a RUP. Certification is a statement by the certifying agency that the applicator is competent and authorized to use or supervise the use of restricted pesticides (EPA 2018a).

Individuals applying any type of pesticide must do so consistent with this federal law as well as state and tribal laws and regulations. In general, states have the primary authority within the state for compliance monitoring and enforcement for the use of pesticides in violation of labeling requirements. The equivalent regulations at the state level are described below in under "State." FIFRA requirements, as enforced by the state (such as adhering to herbicide labels and application instructions), would apply to the use of pesticides under the IPM Program.

Worker Protection Standard

EPA oversees pesticide use through the Worker Protection Standard (WPS). The WPS is a regulation for agricultural pesticides which is aimed at reducing the risk of pesticide poisonings and injuries among agricultural workers and pesticide handlers. WPS protects employees on farms, forests, nurseries, and greenhouses from occupational exposure to agricultural pesticides. The WPS contains requirements for pesticide safety training, notification of pesticide applications, use of personal protective equipment, restricted-entry intervals after pesticide application, decontamination supplies, and emergency medical assistance. The regulation covers two types of workers:

- Pesticide handlers: those who mix, load, or apply agricultural pesticides; clean or repair pesticide application equipment; or assist with the application of pesticides in any way.
- Agricultural workers: those who perform tasks related to the cultivation and harvesting of plants on farms or in greenhouses, nurseries, or forests.

The WPS requirements would apply to the use of pesticides proposed under the IPM Program to protect the health of pesticide handlers and appliers.

STATE

California Hazardous Waste Control Act

The California Hazardous Waste Control Act (HWCA) regulates the generation, treatment, storage, and disposal of hazardous waste (California Health and Safety Code Section 2510 et seq.). Hazardous waste is any material or substance that is discarded, relinquished, disposed of, or burned, or for which there is no intended use or reuse, and the material or substance causes or significantly contributes to an increase in mortality or illness; or the material or substance poses a substantial present or potential hazard to human health or the environment. These materials or substances include spent solvents and paints (oil and latex), used oil, used oil filters, used acids and corrosives, and unwanted or expired products (e.g., pesticides, aerosol cans, cleaners). If the original material or substance is labeled Danger, Warning, Toxic, Caution, Poison, Flammable, Corrosive or Reactive, the waste is very likely to be hazardous. The state program is similar to, but more stringent than, the federal program under RCRA. The regulations list materials that may be hazardous and establish criteria for their identification, packaging, and disposal.

The HWCA would apply to any IPM Program activities that require storage or disposal of hazardous waste (primarily pesticide use).

California Department of Toxic Substances Control

The California Department of Toxic Substances Control (DTSC), a division of the California EPA (CalEPA), has primary regulatory responsibility over hazardous materials in California, working in conjunction with EPA to enforce and implement hazardous materials laws and regulations. DTSC can delegate enforcement responsibilities to local jurisdictions.

The hazardous waste management program enforced by DTSC was created by the HWCA (California Health and Safety Code Section 25100 et seq.), which is implemented by regulations described in the CCR Title 26. The state program is similar to, but more stringent than, the federal program under RCRA. The regulations list materials that may be hazardous and establish criteria for their identification, packaging, and disposal. Environmental health standards for management of hazardous waste are contained in CCR Title 22, Division 4.5. In addition, as required by California Government Code Section 65962.5, DTSC maintains a Hazardous Waste and Substances Site List on EnviroStor, an online database that contains hazardous material sites that meet the criteria to be on the Cortese List.

Hazardous material sites listed on EnviroStor include federal and state response sites, voluntary, school, and military cleanups and corrective actions, and permitted sites.

California's Secretary for Environmental Protection has established a unified hazardous waste and hazardous materials management regulatory program (Unified Program) as required by Senate Bill 1082 (1993). The Unified Program consolidates, coordinates, and makes consistent the administrative requirements, permits, inspections, and enforcement activities for the following environmental programs:

- hazardous waste generator and hazardous waste on-site treatment programs;
- Underground Storage Tank (UST) program;
- hazardous materials release response plans and inventories;
- California Accidental Release Prevention Program;
- Aboveground Petroleum Storage Act requirements for spill prevention, control, and countermeasure plans; and
- California Uniform Fire Code hazardous material management plans and inventories.

The six environmental programs within the Unified Program are implemented at the local level by local agencies—Certified Unified Program Agencies (CUPAs). CUPAs carry out the responsibilities previously handled by approximately 1,300 State and local agencies, providing a central permitting and regulatory agency for permits, reporting, and compliance enforcement.

DTSC regulations would be applicable to the IPM Program if herbicides or other substances proposed for use qualify as a hazardous substance (some pesticides and herbicides become hazardous waste when discarded and, accordingly, must be disposed of as a hazardous waste).

The Safe Drinking Water and Toxic Enforcement Act

This Safe Drinking Water and Toxic Enforcement Act (Proposition 65), passed as a ballot initiative in 1986, requires the state to annually publish a list of chemicals known to the state to cause cancer or reproductive toxicity so that the public and workers are informed about exposures to potentially harmful compounds. CalEPA's Office of Environmental Health Hazard Assessment (OEHHA) administers the act and evaluates additions of new substances to the list. Proposition 65 requires companies to notify the public about chemicals in the products they sell or release into the environment, such as through warning labels on products or signs in affected areas and prohibits them from knowingly releasing significant amounts of listed chemicals into drinking water sources. For pesticide use in a workplace setting, Proposition 65 requirements are met through compliance with California Department of Pesticide Regulation (DPR) regulations, further described below under "California Pesticide Regulatory Program."

California Pesticide Regulatory Program

DPR regulates the sale and use of pesticides in California. DPR is responsible for reviewing the toxic effects of pesticide formulations and determining whether a pesticide is suitable for use in California through a registration process. Although DPR cannot require manufacturers to make changes in labels, it can refuse to register products in California unless manufacturers address unmitigated hazards by amending the pesticide label. Consequently, many pesticide labels that are already approved by EPA also contain California-specific requirements. Pesticide labels defining the registered applications and uses of a chemical are mandated by EPA as a condition of registration. The label includes instructions telling users how to make sure the product is applied only to intended target pests and includes precautions the applicator should take to protect human health and the environment. For example, product labels may contain such measures as restrictions in certain land uses and weather (i.e., wind speed) parameters.

DPR also designates pesticides that can impair human health or pose hazards to the environment as "restricted materials" (similar to RUPs classification by EPA). Pesticides designated as restricted materials (state or federal) have additional use requirements which may include some or all of the following: (1) applicator certification from DPR or the applicable CAC, (2) enhanced supervision requirements for uncertified applicators, (3) a restricted materials permit from the CAC, and (4) additional requirements established by regulation. DPR usually designates restricted materials on the basis of active ingredient, concentration, container size, or use patterns on the labeling. The goal is to allow determination of the status by examining the product container and its labeling (DPR 2018).

Title 3, CCR section 6450, et. seq. further restricts the use of certain pesticides or active ingredients. These restrictions apply to all pesticide applications approved through the restricted materials permit process (through the applicable CAC). Regulatory restrictions may include the amount of pesticide that can be applied; methods of application; where the pesticide can be applied; or additional personal protective equipment that must be worn or used. The permit application process provides CACs with the opportunity to discuss the additional use restrictions with the property operator or pest control business well in advance of the actual application. Unlike permit conditions that are established by the CAC, regulatory use requirements are state regulations and are not attached to the permit (DPR 2018).

All pesticide use under the IPM Program would be required to comply with DPR regulations, such as adhering to pesticide labels and application directions, wearing personal protective equipment, and obtaining a restricted material permit if herbicides designated as 'restricted materials' are proposed for use.

State Water Resources Control Board and Regional Water Quality Control Boards

The State Water Resource Control Board (SWRCB) and nine regional water quality control boards (RWQCBs) are responsible for ensuring implementation and compliance with the provisions of the federal Clean Water Act and the State Porter-Cologne Act. The Porter-Cologne Act of 1969 is California's statutory authority for the protection of water quality. Along with the SWRCB and RWQCBs, water quality protection is the responsibility of numerous water supply and wastewater management agencies, as well as city and county governments, and requires the coordinated efforts of these various entities. These entities and water quality protection are discussed in more detail in Section 3.5, "Hydrology and Water Quality," and would be applicable to any IPM activities under the IPM Program that could directly or indirectly affect water quality.

The SWRCB maintains GeoTracker, an online database used to track and archive compliance data from authorized or unauthorized discharges of waste to land, or unauthorized releases of hazardous substances from USTs. GeoTracker was initially developed in 2000 pursuant to a mandate by the California State Legislature (Assembly Bill 592 and Senate Bill 1189) to investigate the feasibility of establishing a statewide geographic information system (GIS) for leaking underground storage tank (LUST) sites (SWRCB 2020). The GeoTracker database tracks regulatory data for designated Cortese List sites including LUST cleanup sites, solid waste disposal sites, and active Cease and Desist Orders and Cleanup and Abatement Orders (CalEPA 2021).

California Division of Occupational Health and Safety Administration

The California Occupational Safety and Health Administration (Cal/OSHA) assumes primary responsibility for developing and enforcing workplace safety regulations within the state. Cal/OSHA standards are typically more stringent than federal OSHA regulations and are presented in Title 8 of the CCR. Standards for workers dealing with hazardous materials include practices for all industries (General Industry Safety Orders); specific practices are described for construction, hazardous waste operations, and emergency response. Cal/OSHA conducts on-site evaluations and issues notices of violation to enforce necessary improvements to health and safety practices.

Implementation of IPM activities under the IPM Program would require compliance with the Cal/OSHA safety standards and practices regarding workplace safety and providing a safe and healthy environment for workers.

LOCAL

Santa Clara County General Plan

The Santa Clara County General Plan (Santa Clara County 1994) contains strategies and policies regarding hazards and hazardous materials that are applicable to the IPM Program. These policies include:

Strategy 1: Manage Hazardous Materials Safely and Efficiently.

- Policy C-HS 14: All feasible measures to safely and effectively manage hazardous materials and site hazardous materials treatment facilities should be used, including complying with all federal and state mandates.

- **Policy C-HS 15:** To achieve a more effective, efficient and economical regulatory environment, all feasible means to simplify and coordinate locally implemented hazardous materials management regulations should be considered.

City of Morgan Hill General Plan

The City of Morgan Hill General Plan (City of Morgan Hill 2017) provides detailed goals, policies, and actions to guide the city's decisions through 2035. The Natural Resources and Environment Element and the Safety Services and Infrastructure Element provide hazards and hazardous materials goals and policies relevant to the IPM Program. These include:

- **Policy SSI-4.3:** Use and Handling Requirements. Continue a program of regular inspections and monitoring to ensure compliance with local, State, and federal regulations, in order to reduce the risks associated with the use and handling of hazardous materials and wastes. (South County Joint Area Plan 9.00).
- **Policy SSI-4.5:** Storage and Usage. Regularly inspect activities that store and/or use hazardous materials, including above-ground and underground storage tanks and related equipment, to ensure compliance with the City's Hazardous Materials Storage Ordinance (HMSO). (South County Joint Area Plan 9.02).
- **Policy SSI-4.9:** Leaking Equipment. Require Vehicles and other equipment that may threaten the quality of water from leaking fuel tanks or oil spills to be removed from the site and/or repaired. (South County Joint Area Plan 9.07).

City of San Jose General Plan

The Envision San Jose 2040 General Plan (City of San Jose 2018) includes several goals and policies related to hazards and hazardous materials that are relevant to the IPM Program, including:

GOAL EC-6 – Hazardous Materials: Protect the community from the risks inherent in the transport, distribution, use, storage, and disposal of hazardous materials.

- **Policy EC-6.1:** Require all users and producers of hazardous materials and wastes to clearly identify and inventory the hazardous materials that they store, use or transport in conformance with local, state and federal laws, regulations and guidelines.
- **Policy EC-6.2:** Require proper storage and use of hazardous materials and wastes to prevent leakage, potential explosions, fires, or the escape of harmful gases, and to prevent individually innocuous materials from combining to form hazardous substances, especially at the time of disposal by businesses and residences. Require proper disposal of hazardous materials and wastes at licensed facilities.
- **Policy EC-6.3:** Provide information to the public on the proper disposal of products by households and small businesses with practical pollution prevention options for the use, recycling, and disposal of products containing hazardous substances under City and County of Santa Clara programs for Household Hazardous Waste Disposal.

3.4.2 Environmental Setting

DEFINITIONS

California Health and Safety Code Section 25501 defines *hazardous materials* as any material that, because of its quantity, concentration, or physical or chemical characteristics, poses a significant present or potential hazard to human health and safety or to the environment if released into the workplace or the environment. Hazardous materials include, but are not limited to, hazardous substances, hazardous waste, and any material that a handler or the administering agency has a reasonable basis for believing would be injurious to the health and safety of persons or harmful to the environment if released into the workplace or the environment.

A *hazardous chemical* is any chemical whose presence or use poses a physical or health hazard. The federal OSHA Laboratory Standard defines it as a chemical for which there is significant evidence, based on at least one study conducted in accordance with established scientific principles, that it may cause acute or chronic health effects to exposed employees. The term health hazard includes chemicals that are carcinogens, toxic or highly toxic agents, reproductive toxins, irritants, corrosives, sensitizers, hepatotoxins (affecting the liver), nephrotoxins (affecting kidneys), neurotoxins (affecting brain and nervous system), agents that affect the hematopoietic (blood) system, and agents that damage lungs, skin, eyes, or mucous membranes.

Potential Existing Hazards and Contamination

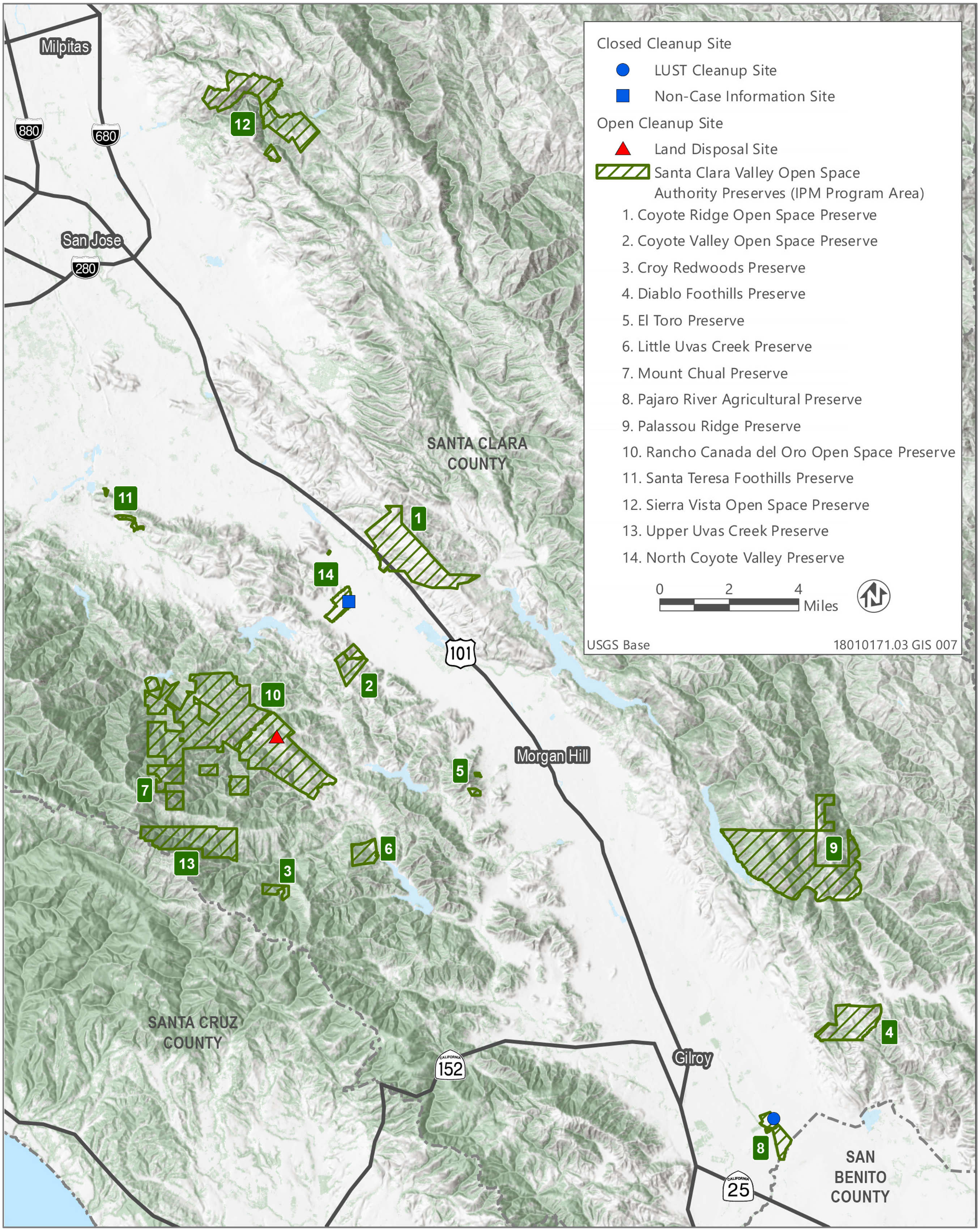
Hazardous materials, if present in soils, can be disturbed and dispersed by ground disturbing pest management activities. Soil contamination generally occurs in areas that are or have been previously developed, especially with industrial-type uses. Soil contamination can also occur in areas where pesticides have been historically applied, as well as in areas that have historically been mined or used for defense activities (e.g., an air force base). Contamination can also be associated with leaking utilities (e.g., leaking petroleum or gas pipelines, or leaking transformers on utility poles), or accidental spills. As described in Section 2.6, "Existing Authority IPM Activities," spraying of herbicides is currently conducted across Authority preserves on approximately 40 acres each year; application is by hand with a backpack sprayer, or by all-terrain vehicle (ATV) with a downward facing boom. Common household hazardous materials such as fuels, oils, lubricants, solvents, and detergents are also currently used by Authority staff for equipment and vehicle use and maintenance and stored at two field offices in the IPM Program Area.

As discussed above in Section 3.4.1, "Regulatory Setting," regulatory databases listing hazardous materials sites provided by numerous federal, state, and local agencies are consolidated in the "Cortese List" pursuant to Government Code Section 65962.5. Cortese List sites can be queried using the DTSC's EnviroStor database and the SWRCB's GeoTracker database. These databases identify sites with suspected and confirmed releases of hazardous materials to the subsurface soil and/or groundwater. The statuses of these sites change as identification, monitoring, and clean-up of hazardous materials progress. Typically, a site is closed once it has been demonstrated that existing site uses combined with the levels of identified contamination on-site present no significant risk to human health or the environment. No hazardous material sites listed in the DTSC's EnviroStor database are present in the IPM Program Area, however three hazardous material sites listed in the SWRCB's GeoTracker database are within the IPM Program Area, as shown in Figure 3.4-1.

One closed LUST site is present in the North Coyote Valley Open Space Preserve (SWRCB 2021a). The site consisted of a 550-gallon underground gasoline tank out of operation since 1949. The gasoline tank was removed from the site in 1988, and the Santa Clara Valley Water District (SCVWD) determined that no further remediation was required due to the low concentration of contaminants in the soil. The SWRCB determined that LUST cleanup was complete, and the case has been closed since 1990 (SCVWD 1990).

A site designated as "Non-case Information" is located on the Pajaro River Agriculture Preserve (SWRCB 2021c). The "non-case Information" designation is used for sites that either have no unauthorized release, had a release to the environment with minimal impact, or are currently evaluated for impacts and may result with the activation of a new case (SWRCB n.d.). This site previously consisted of a 1,000-gallon UST. The UST was removed from the property in 2016, and while petroleum hydrocarbon contamination was reported in soil, the soil contamination concentration was below the relevant environmental screening criteria. The SWRCB determined that no additional cleanup action was required due to the low concentration of petroleum hydrocarbon in the soil, and the site was closed as of 2016 (SWRCB 2021c).

An open but inactive land disposal site, the abandoned Wright Mine, is located in the Rancho Canada del Oro Open Space Preserve. This site was mined for mercury and owned by the Mayfair Packing Company (Hudson Institute of Mineralogy n.d.). Potential contaminants of concern for the sediments and soil surrounding the abandoned mine include chromium and mercury (SWRCB 2021b). The SWRCB determined that cleanup for the site was inactive as of 2003, and the Central Coast RWQCB is now the lead agency responsible for the site. The open and inactive designation indicates that the site has ceased accepting waste but has not been formally closed or is still within the post closure monitoring period, and the site does not pose a significant threat to water quality and does not have groundwater monitoring (SWRCB n.d.). No additional information is currently available for this site and the presence of contamination in soils is possible.



Source: DTSC 2021, SWRCB 2021d

Figure 3.4-1 Existing Hazardous Materials Sites within the IPM Program Area

No other designated hazardous material sites are present in within the IPM Program Area. However, some portions of the IPM Program Area that are not officially designated as hazardous material sites may contain limited remnant contamination from previous agricultural or pesticide use; contamination from nearby urban areas; or may have been exposed to leaks from pipelines, transformers, or utility poles.

Pesticides/Herbicides

Background Information

A pesticide is any substance intended to control, destroy, repel, or attract a pest. The process of registering a pesticide is a scientific, legal, and administrative procedure through which EPA examines:

- the ingredients of a pesticide;
- the particular site or crop where it is to be used;
- the amount, frequency, and timing of its use; and
- storage and disposal practices.

In evaluating a pesticide registration application, EPA assesses a wide variety of potential human health and environmental effects associated with use of the product. The company that is seeking EPA-registration for the pesticide must provide data from studies that comply with EPA testing guidelines. EPA then develops risk assessments that evaluate the potential for (1) harm to humans, wildlife, fish, and plants, including endangered species and non-target organisms, and (2) contamination of surface or ground water from leaching, runoff, and spray drift (EPA 2018b). Risk assessment is crucial to the process of making decisions about pesticides, both new and existing. New pesticides must be evaluated before they can be used, and existing pesticides must be re-evaluated periodically to check that they continue to meet the appropriate safety standards (EPA 2017). EPA also evaluates and approves the language that appears on each pesticide label to ensure the directions for use and safety measures are appropriate to address potential risks. Following label directions is required by law and is necessary to ensure safe use (EPA 2018b).

EPA and individual states register and license pesticides in the U.S. under the authority of FIFRA (EPA 2018b). California state laws that regulate pesticide use, which are enforced by DPR, are more restrictive than federal regulations and most other states. For example, pre-registration and registration requirements in California are more stringent than in other parts of the U.S. DPR reviews the studies submitted to EPA and evaluates their findings, as well as state laws, to determine if additional label requirements or studies are needed.

Current Pesticide Use

As described in Section 2.6, “Existing Authority IPM Activities,” the Authority uses pesticides under existing conditions, although with less frequency and geographic coverage than is proposed under the IPM Program. This includes spraying of herbicides over approximately 40 acres each year (by hand with a backpack sprayer or by ATV with a downward facing boom), and the use of insecticides and rodenticides as needed for pest management. Equipment and materials needed for IPM activities including pesticides, fuels, and oils are stored at the Authority’s administrative office in the city of San Jose, as well as two field offices within the IPM Program Area. Refer to Section 2.6 for more information on current IPM treatments conducted by the Authority, including the use of pesticides.

The Authority complies with all federal and state laws regarding the transport, storage, and disposal of pesticides, and specific recommendations provided on the pesticide label. More information on federal and state regulations related to pesticide use is provided above in Section 3.4.1, “Regulatory Setting.”

Human Health Risks and Toxicity

As with all potentially toxic substances, whether exposure to a pesticide causes harm depends on the dose, how someone is exposed, how sensitive an individual may be to the toxin, and the toxicity of the pesticide involved. People can be exposed to pesticides in three ways: breathing (inhalation exposure), getting it in the mouth or digestive tract (oral exposure), and contact with the skin or eyes (dermal exposure). Inhalation exposure can happen if someone breathes air containing pesticide as a vapor, as an aerosol, or on small particles like dust. Oral exposure happens when someone eats food or drinks water containing pesticides. Dermal exposure happens when someone's skin is exposed to pesticides. This can cause irritation or burns. In more serious cases, skin can absorb the pesticide into the body, causing other health effects. Some pesticides evaporate more easily than others, so they are more likely to be inhaled. Some break down quickly on surfaces; others last longer. A pesticide applied as a liquid spray may drift more easily than dry granules, depending on meteorological conditions. A dry pesticide plowed into the soil can encounter groundwater but is not as likely to drift through the air. All these factors affect the potential risk of human exposure and are considered when DPR makes rules for pesticide use (DPR 2014).

<u>Sensitive Receptors</u>

Pesticides affect people differently. Children may be more sensitive to some pesticides than adults. Compared to adults, they breathe in more air and eat more food relative to their body size, increasing their exposure. Also, their developing bodies may not break down some chemicals as effectively as adults. People of any age with asthma or other chronic diseases may be more likely than healthy individuals to get sick after pesticide exposure. Some individuals are also more sensitive to the odor or other irritant effects of certain pesticides. However, people in the greatest danger of pesticide exposure are those whose exposure is highest, such as workers who mix or apply pesticides (DPR 2014).

Potential sensitive receptors in the IPM Program Area include recreationists that visit three of the 14 preserves that are open to the public (Sierra Vista Open Space Preserve, Rancho Canada del Oro Open Space Preserve, and Coyote Valley Open Space Preserve) to hike, run, and walk their dogs. Other sensitive receptors are visitors that participate in docent-led hikes to several of the preserves that are typically closed to the public and occupied residences adjacent to the IPM Program Area. Low-density residential developments are located adjacent to the Santa Teresa Foothills Open Space Preserve and El Toro Open Space Preserve.

3.4.3 Environmental Impacts and Mitigation Measures

METHODOLOGY

The following reports and data sources were reviewed for this analysis:

- available literature, including documents published by federal, state and local agencies;
- review of Cortese List Data Resources provided by CalEPA, including the SWRCB's GeoTracker database and the DTSC's EnviroStor database; and
- Technical Pesticide Toxicity Evaluation prepared by Bill Williams, PhD (2019); refer to Appendix HAZ-1.

Potential hazards and hazardous materials effects resulting from implementation of the IPM Program were evaluated using the information gathered from these sources to help determine whether any significant risks to public health, safety, or the environment would occur.

THRESHOLDS OF SIGNIFICANCE

An impact related to hazards and hazardous materials is considered significant if implementation of the IPM Program would do any of the following:

- create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials;
- create a significant hazard to the public or the environment through reasonably foreseeable upset and/or accident conditions involving the release of hazardous materials into the environment;
- emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school;
- be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would it create a significant hazard to the public or the environment;

- for a project located within an airport land use plan or, where such a plan has not been adopted, within 2 miles of a public airport or public use airport, would the project result in a safety hazard or excessive noise for people residing or working in the project area;
- impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan;
- expose people or structures, either directly or indirectly, to a significant risk of loss, injury or death involving wildland fires.

ISSUES NOT DISCUSSED FURTHER

Although the IPM Program Area covers a large geographic area near urban communities, there are no schools located within one-quarter mile of the IPM Program Area preserves. Therefore, the IPM Program would not emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school. Impacts specifically associated with schools are not discussed further.

The IPM Program Area is not located in any airport land use plans and no airports are present within 2 miles of the IPM Program Area. Therefore, the IPM Program would not result in a safety hazard or excessive noise for people residing or working in the project area and this issue is not discussed further in this PEIR.

Implementation of the IPM Program would not alter potential emergency evacuation routes or impair an adopted emergency plan, as no alterations to roadways would occur and IPM treatment activities would be temporary and occur off road and within Authority owned preserves. Thus, the IPM Program would not have any significant impacts on adopted emergency response or emergency evacuation plans. This issue is not discussed further in this PEIR.

The exposure of people or structures to risks from wildland fires is addressed in Section 3.8, “Wildfire.” Potential impacts to the environment, including to special-status species and watercourses, from the transportation, use, and storage of hazardous materials are addressed in Section 3.3, “Biological Resources” and Section 3.5, “Hydrology and Water Quality.”

ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

Impact 3.4-1: Potential to Create a Health or Environmental Hazard Through the Use of Vehicle Fuels, Oils, and Lubricants and the Application of Chemicals in IPM Treatments

Mechanical treatments proposed under the IPM Program would require the use of equipment and vehicles, which need fuel, oil, and lubricants to operate. Chemical treatments proposed under the IPM Program would involve the use of pesticides (i.e., herbicides, insecticides, rodenticides, and fumigants), which would be applied in targeted locations for invasive plant and pest control. These hazardous materials have the potential to enter the environment and adversely affect human health or sensitive ecosystems through leaks, accidental spills, or improper handling or use. The Authority would comply with laws, regulations, and policies relevant to the use, transport, storage, and disposal of hazardous materials to minimize potential health risks. EPA oversees pesticide use to minimize health and safety risks for workers through the WPS. Additional requirements for pesticide use are enforced by Cal/OSHA, which provides safety standards for workplaces. DPR administers the California Pesticide Regulatory Program, which regulates the sale and use of pesticides in the state. EPMs HAZ-4 through HAZ-6 have also been incorporated into the IPM Program to further minimize the potential for impacts to human health and the environment from pesticide use. These EPMs include requirements to minimize spills, properly dispose of pesticide containers, triple rinse pesticide containers, lawfully store and handle pesticides, and dispose of unused pesticides and pesticide containers to adequately safeguard human, fish, and wildlife health and prevent soil and water contamination. With implementation of existing laws and regulations and the proposed EPMs, the potential to create a health or environmental hazard associated with use, transport, storage, and disposal of pesticides and other hazardous materials under the IPM Program would be **less than significant.**

Implementation of mechanical treatments under the IPM Program would require the routine use and storage of small quantities of common household hazardous materials such as fuels, oils, and lubricants. These hazardous materials would be stored at Authority-owned offices and buildings, two of which are within the IPM Program Area and are currently used to store equipment and materials (e.g., fuels, oils, and herbicides). Equipment would be fueled, lubricated, and serviced at fueling stations and repair facilities within the region, but not within preserves, which would minimize the potential to release fuels, oils, or lubricants, except if equipment or vehicles are leaking or an accidental spill occurs. The Authority has incorporated EPM HAZ-1 into the IPM Program, which would require the Authority to maintain all diesel- and gasoline-powered equipment per manufacturer's specifications and to inspect all equipment for leaks every day when equipment is in use for a treatment. This EPM would minimize leaks and thus the risk of contamination entering the environment. In addition, fuels, oils, and lubricants are currently in use by equipment within the IPM Program Area. With implementation of the IPM Program, IPM treatments using common household hazardous materials would not increase sufficiently to result in a significant change in the risk of leaks or accidents. The Authority would continue to comply with laws, regulations, and policies relevant to hazardous materials. Although implementation of the IPM Program would slightly increase the storage and use of household hazardous materials in the IPM Program Area, with implementation of EPM HAZ-1 and adherence to relevant regulations, no significant change in the risk of health or environmental hazards would occur.

Chemical treatments under the IPM Program would involve the use of pesticides (i.e., herbicides, insecticides, rodenticides, and fumigants), which would be applied using targeted application methods for invasive plant, pest insect, and other pest control. As described in Appendix HAZ-1 of this PEIR, the toxicity of a pesticide is determined and documented through laboratory and field tests involving target and non-target organisms that experience exposure to that compound. The factor most influencing potential adverse (toxic) effects is the degree of the exposure to the compound, which is based on the amount of the compound that reaches an organism's tissues (i.e., the dose). Several other factors are involved in an exposure, such as the duration over which the dose is received, the target tissue or physiological function affected, and the sensitivity of the organism to the compound. Table 3.4-1 provides a list of the pesticides proposed for use, the formulation and common name of each, and potential for human toxicity. Refer to Appendix HAZ-1 for detailed evaluations of each herbicide, insecticide, and rodenticide compound proposed for use under the IPM Program, including methods of transport and application, along with their potential to risk significant harm to humans and ecological resources. As shown in Table 3.4-1, the pesticides proposed for use under the IPM Program either pose very low toxicity to humans, or can result in acute skin and eye irritation with slight toxicity.

Table 3.4-1 Human Toxicity of Chemicals Proposed for Use under the IPM Program

Chemical	Formulation	Human Toxicity
Glyphosate (Roundup) (Roundup Pro) (RoundupProMax)	Isopropylamine salt, potassium salt, dimethylamine salt & diammonium salt	Overall low toxicity if ingested. Skin and eye irritation possible. No evidence of neurotoxicity, immunotoxicity, or acute toxicity. Reproductive toxicity at very high doses. Recent claims of carcinogenicity (class 2A) based on animal studies. Substantial evidence finds human carcinogenicity unlikely. Very low toxicity via oral and dermal routes. Possible endocrine-disruptor.
Aminopyralid/Triclopyr (Capstone)	Triisopropanolamine salt	Very low toxicity if swallowed. No adverse effects are anticipated from single inhalation exposure to mist. Essentially non-irritating to skin and to eyes. Did not cause allergic skin reactions when tested in guinea pigs. Did not cause cancer in laboratory animals. Did not cause birth defects or any other fetal effects in laboratory animals. Did not interfere with reproduction in animal studies.
Clopyralid (Lontrel) (Cody) (Alligare) (Confront) (Thistledown)	Monoethanolamine salt 3,6-dichloro pyridinecarboxylic acid	Very low toxicity if ingested. Clopyralid is classified by EPA as not likely to be a human carcinogen. Clopyralid caused birth defects in laboratory animal studies at high doses that were severely toxic to the mother. No birth defects were observed in animals given clopyralid at doses several times greater than those expected during normal exposure. Not mutagenic.

Chemical	Formulation	Human Toxicity
Imazapyr (Polaris)	2-[4,5- dihydro-4-methyl-4-(1-methylethyl)-5-oxo-1H-imidazol- 2-yl]-3-pyridinecarboxylic acid	Practically non-toxic if ingested. Chronic mammalian reproduction study indicated no evidence of adverse reproductive effects. The chronic estimated level of concern for mammals was not exceeded for any of the registered uses. The chronic risk for mammals is low following all exposure routes to imazapyr. No evidence of carcinogenicity, neurotoxicity, or immunotoxicity after exposures to Imazapyr.
Clethodim (ENVOY Plus)	2-[1-[[(3-chloro-2-propenyl)oxy]imino]propyl]-5-[2-(ethylthio)propyl]-3-hydroxy-2-cyclohexen-1-one	Clethodim has low toxicity for oral and dermal toxicity and skin irritation. Inhalation toxicity is considered very low toxicity. No treatment related increases in neoplasms were observed in any study. Clethodim is neither neurotoxic nor immunotoxic.
Chlorsulfuron (TELAR)	2-Chloro-N-[(4-meth oxy-6-methyl-1,3,5-triazin-2- yl) aminocarbonyl] benzenesulfonamide	Chlorsulfuron has very low toxicity if ingested. There is no evidence of mutagenicity, carcinogenicity, reproductive or developmental (teratological) effects after exposure to chlorsulfuron. There is some potential for eye and skin irritant, but is not a dermal sensitizer. Very high levels of exposure to chlorsulfuron showed effects on embryo-fetal development in animals, but only at levels equal to or above those causing maternal toxicity.
Fluroxypyr (Vista XRT) (Solvent naphtha) (N-Methyl-2-pyrrolidone)	1-methylheptyl ester	Fluroxypyr has very low acute oral toxicity if ingested. The acute dermal toxicity is very low to none. No Acute inhalation toxicity and no respiratory irritation have been reported. It is not likely to be carcinogenic to humans.
Pelargonic Acid (Scythe)	1-nonanoic acid	The acute toxicity of pelargonic acid to humans is very low, except for moderate, but reversible, eye irritation (Category 2). Oral acute toxicity is very low (Category 4) and dermal and inhalation toxicities are ranked by EPA as Category 3. Exposure to concentrated solutions of pelargonic acid causes skin and eye irritation. It is a natural component of many foods which suggests that it is not toxic at doses that are likely to occur in the diet.
Weed Zap (Essential oils)	N/A	Weed Zap has very low toxicity to humans if ingested. Weed Zap is classified by EPA as very low to non- toxic. It is not a human carcinogen and not mutagenic. Weed Zap has no documented adverse effects in animal studies. No birth defects were observed in animals given Weed Zap at doses several times greater than those expected during normal exposure.
Dithiopyr (Dimension)	3,5-dimethyl 2-(difluoromethyl)-4-isobutyl-6-(trifluoromethyl)pyridine-3,5-dicarbothioate.	Dithiopyr has low acute toxicity to mammals and humans if ingested. Dithiopyr is not known to have mutagenic or carcinogenic effects. It is a very low toxicity chemical for humans by all routes of exposure.
Isoxaben (Gallery)	(N-[3-(1-ethyl-1-methylpropyl)-5-isoxazolyl] -2,6-dimethoxybenzamide and isomers)	Very low toxicity to humans, non-irritating to eyes or skin. Slight increase in liver tumors possible birth defects in rabbits. No evidence of mutagenicity or reproductive toxicity.
Cholecalciferol (Vitamin D3)	Cholecalciferol baits	Cholecalciferol was developed to be acutely toxic to rodents. All routes of exposure are high toxicity, including oral, dermal, and inhalation. Based on the recommended and typical methods of use, however, actual potential toxicity to humans is low as the characteristics of formulation and mode of delivery are designed to minimize potential uptake of the chemical when used as a rodent bait.

Chemical	Formulation	Human Toxicity
Wasp-Freeze (Pyrethrin/Pyrethroids)	Cyclopropanecarboxylic acid, 2-methyl-4-oxo-3-(2-propynyl) cyclopent-2-enyl-cis, trans-chysnthemate	Very low toxicity if ingested. Acute toxicity varies by the type of pyrethroid as there are numerous variations and combinations of products containing the base chemical. Minor effects on the nervous system have been observed. No other significant effects have been reported. Some animal studies suggest that low level exposures may result in reproductive and immunological effects. Available data indicate that pyrethrin may be of some carcinogenic concern to humans. Wasp-freeze application would be targeted to wasp nests only. Because the application is quick and targeted, it is unlikely to be encountered or pose any significant health risks to humans.
Garden Safe (Insecticidal Soap Spray)	Potassium laureate, potassium myristate, potassium oleate, and potassium ricinoleate.	Soap salts have low oral and dermal toxicity. At excessive exposures, they may be irritating to the skin and eyes. These products are generally considered safe by the FDA. EPA classifies soap salts as very low toxicity for acute effects.
Indoxacarb (Advion Gel Baits)	(S)-methyl 7-chloro-2,5-dihhydro-2-diehydro-2-[[(methoxycarbonyl) [4-(trifluoromethoxy) pehenyl]amino]carbonyl]1,2-e][1,3,4]pxadoazome-4a(3H)-carboxylate	Indoxacarb is classified as a moderate toxicity oral toxicant. It is listed as very low toxicity for dermal and inhalation toxicity. It is a moderate eye irritant. There is no evidence that indoxacarb is carcinogenic or mutagenic. However, Indoxacarb would be applied as gel baits in buildings and structures and thus is unlikely to be encountered or pose any significant health risks to humans.
Gentrol Point Source (Hydroprene)	Ethyl(2E,4E.7S)-3,7,11-trimethyl-2,4-dodecadenoate	Hydroprene is listed as very low toxicity oral toxicant and low toxicity for dermal and inhalation routes of exposure. Slight to moderate toxicity to mammals. No evidence of mutagenicity, teratogenicity, or reproductive effects.
Sulphuryl fluoride (Vikane) (Termafume)	Sulfuryl difluoride	Sulphuryl fluoride is listed as a RUP by EPA. While sulphuryl fluoride is only slightly toxic via inhalation, it is considered an acute hazard because it is an odorless, colorless gas.

FDA = Federal Drug Administration

Source: NPIC 2000 and Appendix HAZ-1 of this PEIR; see citations therein.

Sulphuryl fluoride, the fumigant that would be used for termite fumigation, can be an acute hazard because it is a colorless, odorless gas. However, termite fumigation would only be used on structures within the IPM Program Area as a last resort to control termite infestations, and fumigation would not be a regular occurrence on Authority lands. The fumigation process, including the handling of sulphuryl fluoride, would be implemented by certified applicators and the treated structure would be securely sealed with a tent to trap the gas inside. Sulphuryl fluoride is only slightly toxic when inhaled; however, it is listed as a RUP by EPA, because it is a colorless and odorless gas, but it does not cause skin or eye irritation at the concentrations required for successful termite fumigation. To prevent potential exposure, certified applicators would introduce trace amounts of a warning agent, chloropicrin, into the structure. Chloropicrin has a strong odor, causes respiratory and eye irritation, and dissipates at a slower rate than sulphuryl fluoride. Signs warning of the fumigation would be posted outside of the treated building and the entire building would be tented to prevent people from entering the structure during fumigation. Before anyone is allowed back into a treated structure, air monitoring inside of the treated structure would be conducted to make sure residual concentrations of the fumigant are below EPA established limits (NPIC 2000). The exposure of humans and nontarget organisms to residues of sulphuryl fluoride is not anticipated due to the aeration process, the quick speed at which residual gas dissipates in the air, and air monitoring requirements of EPA after fumigation is complete (EPA 1993).

Rodenticides would be used as part of the IPM Program as a last resort to control pest infestations that create threats to human health or safety after other non-chemical treatment options are exhausted. If deemed necessary, rodenticides would only be used in structures and buildings in tamper-proof anchored bait containers to avoid non-target species interactions. Therefore, human or environmental exposure to rodenticides would be low and would not result in significant health or environmental hazards. Similarly, the Authority uses insecticides as a last resort to treat problem insects or rodent infestations, and are delivered through tamper proof bait stations in structures and buildings or by quick, targeted spray by hand (e.g., to a problem wasp nest). Therefore, the use of insecticides would also be unlikely to result in significant risks to health or the environment.

Human exposure could occur to workers or the public through handling of herbicides or, when ground-sprayed by hand from backpacks or by a downward-directed boom mounted on an ATV. The risk of herbicide drift from hand or boom application is low because the compounds would be applied in a precisely targeted manner, close to the ground; however, if wind speeds rise the potential for wind-driven drift cannot be dismissed. Consequently, the Authority would implement EPM HAZ-5, which prohibits herbicide application during precipitation or when winds exceed 7 miles per hour. Workers who mix, load, transport, and apply pesticides are normally considered to have the greatest potential for exposure, because of the nature of their work and are, therefore, at highest risk. Worker exposure to pesticides can occur from accidental splashes or spills of chemicals, leakages, or faulty spraying equipment. The potential for worker exposure would be minimized by following the instructions on how to use the herbicide, use of proper PPE, and washing hands after pesticide handling or before eating. Exposure of the general population to herbicides occurs mainly through eating food and drinking water contaminated with herbicides, or when living close to a location where herbicides are used (Damalas and Eleftherohorinos 2011). No chemical treatments would occur on Pajaro River Agricultural Preserve, the Authority's only preserve with row crops, therefore public exposure through food consumption would not occur. In addition, as described in Section 3.5, "Hydrology and Water Quality," pesticide use has the potential to contaminate surface or groundwater quality if used in close proximity to surface waters, spilled, or used under the wrong conditions. Pesticides used for the IPM Program would be applied according to the manufacturer's label directions and consistent with EPMs HAZ-4 and HAZ-5 which protect surface and groundwaters, control drift, and ensure proper storage, handling, and cleanup. Potential public exposure through drinking water contamination would be minimal.

In addition, as discussed above under Section 3.4.1, "Regulatory Setting," EPA oversees pesticide use and health and safety of workers through the WPS. The WPS is a pesticide regulation that is aimed at reducing the risk of pesticide poisonings and injuries among workers and pesticide handlers. The WPS contains requirements for pesticide safety training, notification of pesticide applications, use of PPE, restricted-entry intervals after pesticide application, decontamination supplies, and emergency medical assistance. In addition, Cal/OSHA has safety standards and practices regarding workplace safety and providing a safe and healthy environment for workers, and the California Pesticide Regulatory Program regulates the sale and use of pesticides in California. DPR is responsible for reviewing the toxic effects of pesticide formulations and determining whether a pesticide is suitable for use in California through a registration process (EPA 2017). The label of each pesticide includes instructions telling users how to make sure the product is applied only to intended target pests and includes precautions the applicator should take to protect human health and the environment. These include weather conditions, such as maximum wind speed to avoid pesticide drift and avoidance of precipitation to minimize unintended runoff (EPA 2016). RCRA, HWCA, and the DTSC include regulations applicable to the packaging, storage, and disposal of specific hazardous materials. Some pesticides become hazardous waste when discarded and, accordingly, must be disposed at authorized hazardous waste sites. The Authority would adhere to all relevant regulations related to the use, storage, and transport of pesticides and other hazardous materials to ensure that upset and accident conditions involving use, transport, and handling of hazardous substances would be significantly reduced. Compliance with all laws, regulations, and herbicide label instructions, along with proper PPE and relevant EPMs, would prevent significant risks related to human exposure or environmental risk from the use of pesticides.

Furthermore, many of the pesticides proposed for use under the IPM Program are currently being applied within the IPM Program Area. Implementation of the IPM Program would increase the number of simultaneous treatment activities by a few additional treatments over current levels in the IPM Program Area, which would not substantially change the amount pesticide compounds applied to the IPM Program Area. Furthermore, several EPMs have been incorporated into the IPM Program to further minimize potential health risks from pesticide use (EPM HAZ-4 through HAZ-6). EPM HAZ-4 requires that the Authority implement several pesticide handling and mixing measures, such as not leaving spray tanks unattended when filling, addressing any pesticide spills immediately, disposing pesticide containers properly, triple rinsing of pesticide containers, as well as lawful storage, handling, and disposal of pesticides and pesticide containers. EPM HAZ-5 requires the implementation of several measures related to pesticide application, including reviewing and adhering to pesticide labels; using low impact application techniques and drift reduction techniques, such as spot treatments and drift retardants; and prohibiting application during precipitation or winds over 7 miles per hour. EPM HAZ-6 would require notification of pesticide use in the vicinity of public areas.

Adherence to existing laws and regulations and implementation of EPMs would provide a foundation for assuring effective, yet relatively safe, use of pesticides and other common household hazardous materials. Therefore, the impact associated with use, transport, storage, and disposal of hazardous materials under the IPM Program would be **less than significant**.

Impact 3.4-2: Potential to Expose the Public or Environment to Significant Hazards from Disturbance to Known Hazardous Materials Sites

Ground disturbing manual and mechanical IPM treatments have the potential to expose workers, the public, and the environment to risks associated with existing hazardous materials if present within soils in the treatment areas. Treatment activities would typically occur in undeveloped areas, which are unlikely to contain hazardous materials. However, there is one known active hazardous materials site in the IPM Program Area, the Wright Mine in Rancho Canada del Oro Open Space Preserve. Disturbance of contaminated soils could result in the exposure of the public and environment to health hazards from existing hazardous materials, if present. Therefore, this impact is **potentially significant**.

Treatment activities would occur in undeveloped, open space preserves, which are unlikely to contain hazardous materials. However, as shown in Figure 3.4-1, three hazardous materials sites are present within the IPM Program Area. Two of the sites have been remediated and cleanup actions are complete; therefore, no risks associated with ground disturbing IPM treatments in those areas are anticipated. Another site, the abandoned Wright Mine located within the Rancho Canada del Oro Open Space Preserve, is an open case and there is a potential for chromium and mercury contamination in the sediments and soil surrounding the abandoned mine site (SWRCB 2021b). If ground disturbing IPM treatments occur in the vicinity of the abandoned mine, hazardous materials could be accidentally released into the environment if present. If released, hazardous materials could enter waterways via runoff or expose the public to harmful effects through inhalation or dermal exposure. Therefore, ground disturbing IPM treatments in the vicinity of the abandoned Wright Mine in the Rancho Canada del Oro Open Space Preserve have the potential to expose people (e.g., workers or the public) or the environment to significant health hazards if hazardous materials are present, and this impact would be **potentially significant**.

Mitigation Measure 3.4-2: Identify and Avoid Known Hazardous Waste Sites

Prior to the start of IPM treatment activities requiring soil disturbance in the vicinity of the abandoned Wright Mine, the Authority shall mark/flag the Wright Mine, including a 100-foot buffer around the mine area, and no soil disturbing IPM treatment activities will occur within 100 feet of the site boundaries. If it is determined through coordination with the Central Coast RWQCB, the lead agency responsible for the site, that no potential or known contamination is located on the site, the treatment may proceed as planned.

Significance after Mitigation

Mitigation Measure 3.4-2 requires that the Authority flag the one known hazardous material site in the IPM Program Area prior to ground disturbing treatments in the vicinity of the site, and prohibits ground disturbing IPM activities within 100 feet of the site. Alternatively, if the Authority determines that there is no potential for contamination at the site in coordination with the Central Coast RWQCB, then no flagging would be necessary and ground disturbing treatments could occur. Because the hazardous waste site would be flagged and avoided, unless it is determined that no hazardous materials are present in soils, no exposure-related risks associated with the disturbance of a hazardous waste site to the public or environment would occur. Therefore, the potential to expose people (e.g., workers or the public) or the environment to significant health hazards would be **less than significant after mitigation**.

3.5 HYDROLOGY AND WATER QUALITY

This section summarizes the regulatory context and specific policies related to hydrology and water quality, describes the existing hydrologic conditions of the IPM Program Area, and evaluates potential hydrological and water quality impacts from implementation of the proposed IPM Program.

There were no comments received on the Notice of Preparation related to hydrology and water quality.

3.5.1 Regulatory Setting

FEDERAL

Clean Water Act

The Clean Water Act (CWA) consists of the Federal Water Pollution Control Act of 1972 and subsequent amendments. The CWA provides for the restoration and maintenance of the physical, chemical, and biological integrity of the nation's waters. Various elements of the CWA address water quality, which are discussed below.

<u>Section 404</u>

Section 404 of the CWA prohibits the discharge of fill material into waters of the United States, including many wetlands, except as permitted under separate regulations by the U.S. Army Corps of Engineers (USACE) and the U.S. Environmental Protection Agency (EPA). To discharge dredged or fill material into waters of the United States, including wetlands that come within the definition of that term, Section 404 requires projects to receive authorization from the Secretary of the Army, acting through the USACE. Waters of the U.S. are generally defined as "…waters which are currently used, or were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters which are subject to the ebb and flow of the tide; territorial seas and tributaries to such waters."

<u>Section 402</u>

Section 402 of the CWA establishes the National Pollutant Discharge Elimination System (NPDES) permit program to regulate discharges of pollutants into waters of the United States. A NPDES permit sets specific discharge limits for point sources discharging pollutants into waters of the United States and establishes monitoring and reporting requirements, as well as special conditions. Two types of nonpoint source discharges are controlled by the NPDES program: discharges caused by general construction activities and the general quality of stormwater in municipal stormwater systems. The goal of the NPDES nonpoint source regulations is to improve the quality of stormwater discharged to receiving waters to the maximum extent practicable. Regional Water Quality Control Boards (RWQCBs) in California are responsible for implementing the NPDES permit system (see the discussion of state regulations below).

<u>Section 401</u>

Under CWA Section 401, applicants for a federal license or permit to conduct activities that may result in the discharge of a pollutant into waters of the United States must obtain certification for the discharge. The certification must be obtained from the state in which the discharge would originate or, if appropriate, from the interstate water pollution control agency with jurisdiction over the affected waters at the point where the discharge would originate. Therefore, all projects that have a federal component and may affect state water quality (including projects that require federal agency approval, such as issuance of a Section 404 permit) must also comply with CWA Section 401. Water quality certification requires evaluation of potential impacts in light of water quality standards and CWA Section 404 criteria governing discharge of dredged and fill materials into waters of the United States. The federal government delegates water pollution control authority under CWA Section 401 to the states (and in California, ultimately to the RWQCBs).

<u>Section 303</u>

Section 303(d) of the CWA requires states to develop lists of water bodies that do not attain water quality objectives after implementation of required levels of treatment by point source dischargers (municipalities and industries). Section 303(d) requires that the state develop a total maximus daily load (TMDL) for each of the listed pollutants. The TMDL is the amount of the pollutant that the water body can receive and still be in compliance with water quality objectives. The TMDL is also a plan to reduce loading of a specific pollutant from various sources to achieve compliance with water quality objectives. The EPA must either approve a TMDL prepared by the state or disapprove the state's TMDL and issue its own. NPDES permit limits for listed pollutants must be consistent with the waste load allocation prescribed in the TMDL. After implementation of the TMDL, it is anticipated that the problems that led to placement of a given pollutant on the Section 303(d) list would be remediated.

Federal Antidegradation Policy

The Federal Antidegradation Policy was enacted to provide protection to high-quality water resources of national importance. It directs states to develop and adopt statewide antidegradation policies that include protecting existing instream water uses and maintaining a level of water quality necessary to protect those existing uses and the water quality of high-quality waters. In the EPA's CWA regulations regarding water quality standards (40 CFR Chapter 1, Section 131.12[a][3]), the criteria for requiring an antidegradation standard includes the following conditions:

- Existing instream water uses and a level of water quality necessary to maintain those uses shall be maintained and protected.
- Water quality will be maintained and protected in waters that exceed water quality levels necessary for supporting fish, wildlife, and recreational activities, and water quality, unless the State deems that water quality levels can be lowered to accommodate important economic or social development. In these cases, water quality levels can only be lowered to levels that support all existing uses.
- Where high quality waters constitute an outstanding National resource, such as waters of National and State parks and wildlife refuges and waters of exceptional recreational or ecological significance, that water quality shall be maintained and protected.

STATE

State Water Resources Control Board

In California, the State Water Resources Control Board (SWRCB) has broad authority over water quality control issues for the state. SWRCB is responsible for developing statewide water quality policy and exercises the powers delegated to the state by the federal government under the CWA. Other state agencies with jurisdiction over water quality regulation in California include the California Department of Public Health Services (formerly Department of Health Services) (for drinking water regulations), the California Department of Pesticide Regulation, the California Department of Fish and Wildlife (CDFW) (formerly Department of Fish and Game), and the Office of Environmental Health and Hazard Assessment. Regional authority for planning, permitting, and enforcement is delegated to the nine RWQCBs. The regional boards are required to formulate and adopt water quality control plans for all areas in the region and establish water quality objectives in the plans.

Porter-Cologne Water Quality Control Act

The Porter-Cologne Water Quality Control Act requires that each of the nine RWQCBs prepare and periodically update basin plans for water quality control. Each basin plan sets forth water quality standards for surface water and groundwater and actions to control nonpoint and point sources of pollution to achieve and maintain these standards. Basin plans offer an opportunity to protect wetlands through the establishment of water quality objectives. The RWQCB's jurisdiction includes waters of the United States, as well as areas that meet the definition of "waters of the state." "Waters of the state" is defined as any surface water or groundwater, including saline waters, within the boundaries of the state. The RWQCB has the discretion to take jurisdiction over areas not federally protected under CWA Section 404 provided they meet the definition of waters of the state and the State Water Resources Control

Board published a new set of procedures for discharges of dredged or fill material into waters of the state on March 22, 2019. Mitigation requiring no net loss of wetlands functions and values of waters of the state typically is required by the RWQCB.

The San Francisco Bay and Central Coast RWQCBs have jurisdiction over the IPM Program Area (SWRCB 2020). The San Francisco Bay RWQCB's jurisdiction encompasses most of the preserves in the northern and southeastern portion of the IPM Program Area while the Central Coast RWQCB's jurisdiction encompasses the southernmost preserves (see Table 3.5-1). In addition to being responsible for preparing and updating the basin plan, the San Francisco Bay and Central Coast RWQCBs administer the adoption of waste discharge requirements (WDRs), manage groundwater quality, and approve projects within their boundaries under the NPDES General Permit for Stormwater Discharges Associated with Construction and Land Disturbance Activities (General Permit).

Table 3.5-1 Regional Water Quality Control Board Jurisdiction

Preserve	Regional Water Quality Control Board Jurisdiction
Coyote Ridge	San Francisco Bay RWQCB
Coyote Valley	San Francisco Bay and Central Coast RWQCB
Croy Redwoods	Central Coast RWQCB
Diablo Foothills	San Francisco Bay and Central Coast RWQCB
El Toro Preserve	Central Coast RWQCB
Mount Chual	San Francisco Bay and Central Coast RWQCB
Pajaro River Agricultural Preserve	Central Coast RWQCB
Palassou Ridge	San Francisco Bay RWQCB
Rancho Canada del Oro	San Francisco Bay and Central Coast RWQCB
Santa Teresa Foothills	San Francisco Bay RWQCB
Sierra Vista	San Francisco Bay RWQCB
Upper Uvas	Central Coast RWQCB
Little Uvas	Central Coast RWQCB
North Coyote Valley	San Francisco Bay RWQCB

Source: SWRCB 2020

State Nondegradation Policy

In 1968, as required under the federal antidegradation policy described previously, SWRCB adopted a nondegradation policy aimed at maintaining high quality for waters in California. The nondegradation policy states that the disposal of wastes into state waters shall be regulated to achieve the highest water quality consistent with maximum benefit to the people of the state and to promote the peace, health, safety, and welfare of the people of the state. The policy states:

a) Where the existing quality of water is better than required under existing water quality control plans, such quality would be maintained until it has been demonstrated that any change would be consistent with maximum benefit to the people of the state and would not unreasonably affect present and anticipated beneficial uses of such water.

b) Any activity which produces waste or increases the volume or concentration of waste and which discharges to existing high-quality waters would be required to meet waste discharge requirements.

California Fish and Game Code Section 1602 (Lake and Streambed Alteration)

CDFW is responsible for conserving, protecting, and managing California's fish, wildlife, and native plant resources. Fish and Game Code Section 1602 states that an entity must notify CDFW prior to substantially diverting or obstructing the natural flow of, or substantially changing or using any material from the bed, channel, or bank of, any river, stream, or lake, or depositing or disposing of debris, waste, or other material containing crumbled, flaked, or ground pavement where it may pass into any river, stream, or lake. If CDFW determines that the proposed activity may substantially adversely affect an existing fish or wildlife resource, CDFW will issue a Lake or Streambed Alteration Agreement for that activity, that includes reasonable measures necessary to protect the resource, and the entity must conduct the activity in accordance with the Agreement.

Safe Drinking Water Act

As mandated by the Safe Drinking Water Act (Public Law 93-523), passed in 1974, EPA regulates contaminants of concern to domestic water supply. Such contaminants are defined as those that pose a public health threat or that alter the aesthetic acceptability of the water. These types of contaminants are regulated by EPA primary and secondary maximum contaminant levels (MCLs). MCLs and the process for setting these standards are reviewed triennially. Amendments to the Safe Drinking Water Act enacted in 1986 established an accelerated schedule for setting drinking water MCLs. EPA has delegated to the California Department of Public Health Services the responsibility for California's drinking water program. California Department of Public Health Services is accountable to EPA for program implementation and for adoption of standards and regulations that are at least as stringent as those developed by EPA. Title 22 of the California Code of Regulations (Article 16, Section 64449) defines secondary drinking water standards, which are established primarily for reasons of consumer acceptance (i.e., taste) rather than for health issues.

LOCAL

Santa Clara County General Plan

The Santa Clara County General Plan (Santa Clara County 1994) contains the goals, strategies, policies, and implementing actions that guide in the overall land use development of the County. The hydrology and water quality goals and policies relevant to the IPM Program include:

- **Policy C-RC 18:** Water quality countywide should be maintained and improved where necessary to ensure the safety of water supply resources for the population and the preservation of important water environments and habitat areas.
- **Policy C-RC 19:** The strategies for maintaining and improving water quality on a countywide basis, in addition to ongoing point source regulation, should include:
  a. effective non-point source pollution control;
  b. restoration of wetlands, riparian areas, and other habitats which serve to improve Bay water quality; and
  c. comprehensive Watershed Management Plans and "best management practices" (BMPs).
- **Policy C-RC 20**: Adequate safeguards for water resources and habitats should be developed and enforced to avoid or minimize water pollution of various kinds, including:
  a. erosion and sedimentation;
  b. organic matter and wastes;
  c. pesticides and herbicides;
  d. effluent from inadequately functioning septic systems;
  e. effluent from municipal wastewater treatment plants;
  f. chemicals used in industrial and commercial activities and processes;
  g. industrial wastewater discharges;
  h. hazardous wastes; and
  i. non-point source pollution.

City of Morgan Hill General Plan

The City of Morgan Hill's General Plan (City of Morgan Hill 2017) provides detailed goals, policies, and actions to guide the city's decisions over the next two decades. The Natural Resources and Environment Element provides hydrology and water quality related goals relevant to the IPM Program. These include:

- **Policy NRE-8.1:** Contamination from Toxic Chemicals. Protect water quality from contamination, and monitor it to assure that present policies and regulations are adequate. Prohibit such uses as waste facilities, septic systems, and industries using toxic chemicals where polluting substances may come in contact with groundwater, floodwaters, and creeks or reservoir waters. (South County Joint Area Plan 8.00)
- **Policy NRE-8.7:** Aquifer Protection. In order to provide greater protection of the aquifers which supply drinking water to the South County, give special consideration to the management of contaminants (e.g., hazardous materials, sanitary effluents) in groundwater recharge areas where no protective aquitard layer exists. (South County Joint Area Plan 8.13)
- **Policy NRE-8.8:** Water Quality Compliance. Implement Best Management Practices to improve water quality, in conformance with the South Santa Clara County and City of Morgan Hill Total Maximum Daily Load (TMDL) Monitoring Plan for the Pajaro River Watershed and findings in subsequent annual status updates, as required for compliance with community standards and applicable State and federal provisions.

City of San Jose General Plan

The Envision San Jose 2040 General Plan (City of San Jose 2018) establishes the vision and strategies for future anticipated growth in the city through year 2040. Chapter 3, "Environmental Leadership," of the General Plan incorporates strategies and policies related to hydrology and water quality that are applicable to the IPM Program, including:

- **Policy ER-8.1:** Manage stormwater runoff in compliance with the City's Post-Construction Urban Runoff (6-29) and Hydromodification Management (8-14) Policies.
- **Policy ER-9.6:** Protect groundwater recharge areas, particularly creeks and riparian corridors.

3.5.2 Environmental Setting

TOPOGRAPHY AND CLIMATE

Several of the preserves within the IPM Program Area are located within the eastern portion of the Santa Cruz Mountains, which are situated on the San Francisco Peninsula, or within the Diablo Mountain Range, east of Gilroy, Morgan Hill, Los Gatos, and Sunnyvale. Other preserves are located on the Santa Clara Valley floor. Thus, the general topography of much of the IPM Program Area consists of steep slopes within mountainous areas and flat valleys in the foothills and valley floor. Rainfall within the general vicinity of the IPM Program Area typically occurs between November and April, with seasonal rainfall totals varying greatly from 3 to 6 inches depending upon topography, exposure, and elevation. Typically, most rainfall is received in February and the months with the least rainy days are June, July, and August (U.S. Climate Data 2019).

HYDROLOGY AND DRAINAGE

Surface Waters

Surface waters occur as streams, lakes, or ponds, or are found in floodplains, wetlands, and other collection sites. Watersheds are land or "basins" within which all precipitation within a given watershed drains to via creeks or streams. The preserves within the IPM Program Area are located within two major watersheds, the Coyote Watershed and the Pajaro Watershed (refer to Figure 3.5-1). The extensive open spaces within the IPM Program Area provide an undeveloped, vegetated setting with little impervious surface that allows rain and other surface runoff to percolate into the ground.

Several surface waters, primarily creeks, are located within IPM Program Area preserves. These surface waters, the IPM Program Area preserve in which they are located, and the watershed in which occur are listed in Table 3.5-2. They are also shown on Figure 3.5-2, along with reservoirs and additional unnamed tributaries and drainages that occur in the vicinity of the IPM Program Area.

Table 3.5-2 Surface Waters in the IPM Program Area

Existing Surface Waters	Location in the IPM Program Area	Watershed
Coyote Canal	Coyote Ridge Open Space Preserve	Coyote
Coyote Creek	Coyote Ridge Open Space Preserve and Palassou Ridge Open Space Preserve	Coyote
Metcalf Creek	Coyote Ridge Open Space Preserve	Coyote
Fisher Creek	Coyote Valley Open Space Preserve and North Coyote Valley Open Space Preserve	Coyote
Croy Creek	Croy Redwoods Open Space Preserve	Pajaro
San Ysidro Creek	Diablo Foothills Open Space Preserve	Pajaro
Llagas Creek	Mount Chual Open Space Preserve and Rancho Canada del Oro Open Space Preserve	Pajaro
Twin Falls Creek	Mount Chual Open Space Preserve and Rancho Canada del Oro Open Space Preserve	Pajaro
Jones Creek	Pajaro River Agricultural Preserve	Pajaro
Pajaro River	Pajaro River Agricultural Preserve	Pajaro
Bear Creek	Palassou Ridge Open Space Preserve	Coyote
Canada de los Osos Creek	Palassou Ridge Open Space Preserve	Coyote
Dexter Canyon Creek	Palassou Ridge Open Space Preserve	Coyote
Baldy Ryan Canyon Creek	Rancho Canada del Oro Open Space Preserve	Pajaro
Barrett Canyon Creek	Rancho Canada del Oro Open Space Preserve	Coyote
Cherry Canyon Creek	Rancho Canada del Oro Open Space Preserve	Coyote
Edson Canyon Creek	Rancho Canada del Oro Open Space Preserve	Pajaro
Larabee Gulch Creek	Rancho Canada del Oro Open Space Preserve	Coyote
Limekiln Canyon Creek	Rancho Canada del Oro Open Space Preserve	Pajaro
Coyote Alamitos Canal	Santa Teresa Foothills Open Space Preserve	Coyote
Arroyo Aguague Creek	Sierra Vista Open Space Preserve	Coyote
Upper Penitencia Creek	Sierra Vista Open Space Preserve	Coyote
Uvas-Carnadero Creek	Upper Uvas Creek Open Space Preserve	Pajaro
Little Uvas Creek	Upper Uvas Creek Open Space Preserve	Pajaro
Swanson Canyon Creek	Upper Uvas Creek Open Space Preserve	Pajaro

Source: SCVWD 2017 and USGS 2017

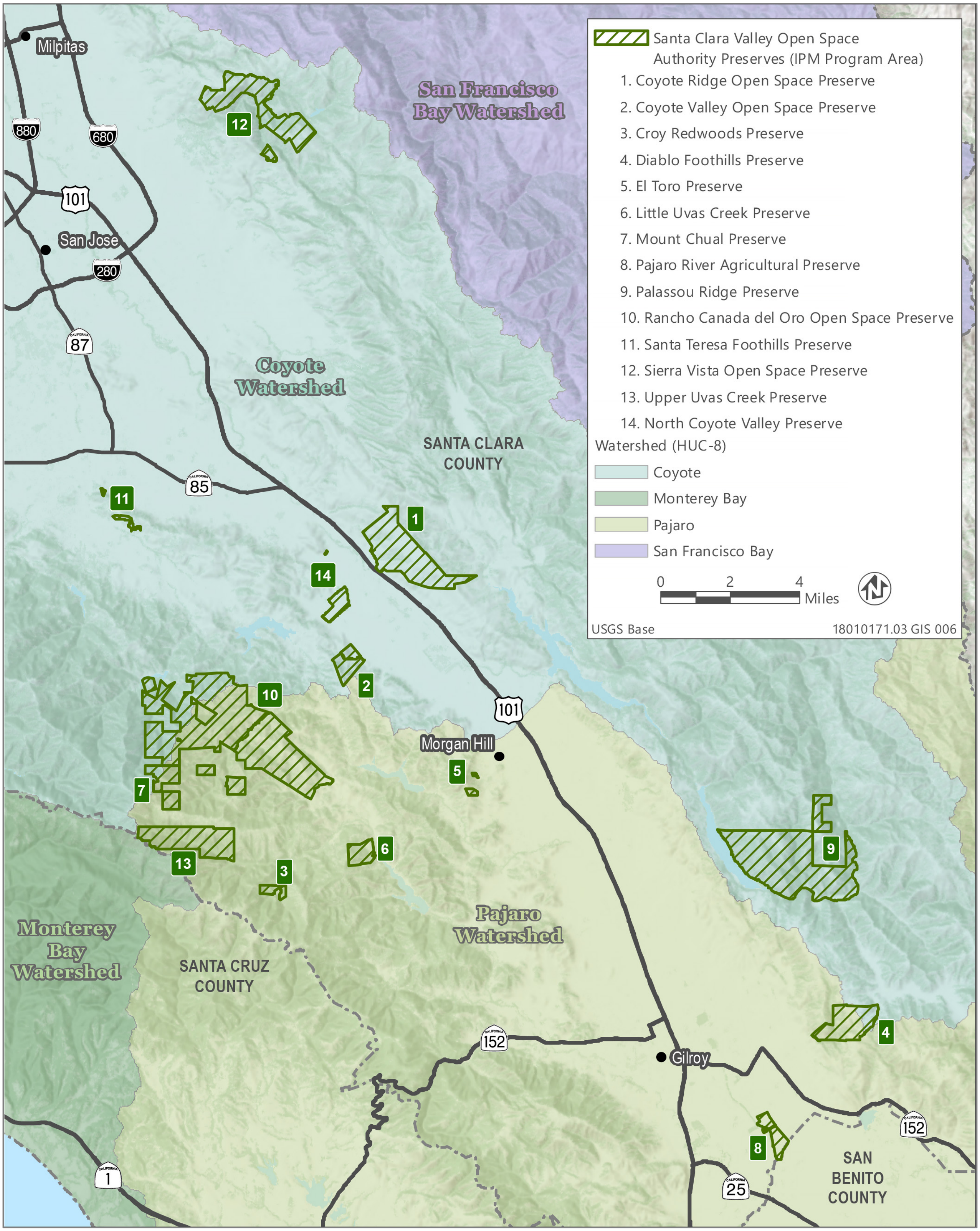
Groundwater

The majority of runoff from snowmelt and rainfall flows down streams into low gradient valleys and either percolates into the ground or is discharged to the sea. This percolating flow is stored in alluvial groundwater basins. Three of the IPM Program Area preserves are at least partially underlain by designated groundwater basins. These groundwater basins and the IPM Program Area preserves under which they occur are listed in Table 3.5-3 and are shown in Figure 3.5-3.

Table 3.5-3 Existing Groundwater Basins in the IPM Program Area

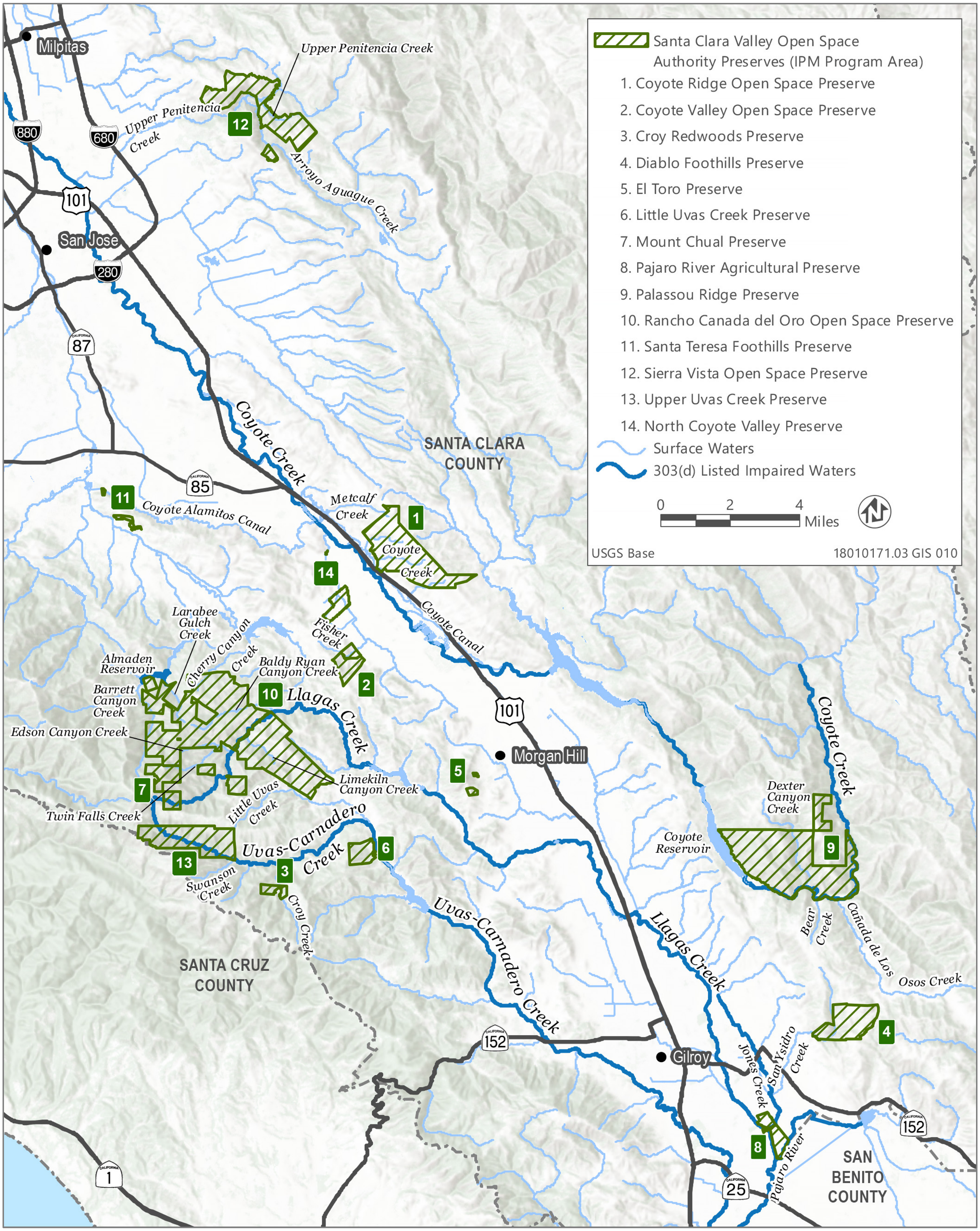
Existing Groundwater Basins	Location in the IPM Program Area
Gilroy-Hollister Valley Groundwater Basin	Pajaro River Agricultural Preserve (El Toro Open Space Preserve is immediately adjacent)
Santa Clara Valley Groundwater Basin	Coyote Ridge Open Space Preserve and North Coyote Valley Open Space Preserve (Coyote Valley and Santa Teresa Foothills Open Space Preserves are immediately adjacent)

Source: DWR 2018



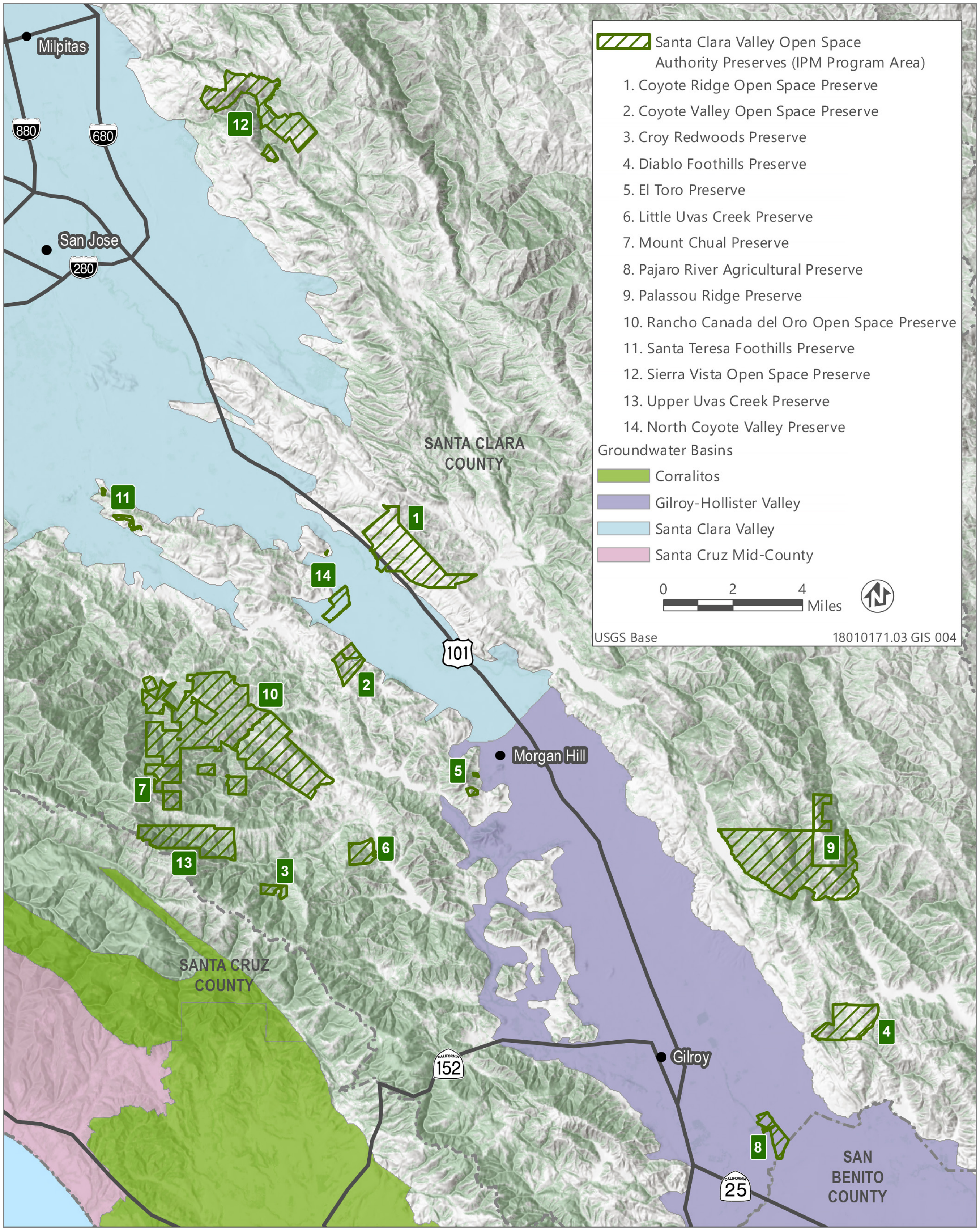
Source: USGS 2017

Figure 3.5-1 Watersheds in the IPM Program Area



Source: EPA 2015 and SCVWD 2017

Figure 3.5-2 Surface Waters and Impaired Water Bodies in the IPM Program Area



Source: DWR 2018

Figure 3.5-3 Groundwater Basins in the IPM Program Area

WATER QUALITY

Surface Water Quality

Impaired water bodies are surface waters that are not meeting water quality standards established by the EPA (303(d) list). Six creeks designated under Section 303(d) of the Clean Water Act as impaired because of the presence of certain pollutants are within 500 feet of IPM Program Area preserves, and three pass through the IPM Program Area (refer to Figure 3.5-2). The creeks that are designated as impaired in the IPM Program Area along with the reason for their listing are included in Table 3.5-4.

Table 3.5-4 Impaired Water Bodies within the IPM Program Area

Impaired Water Bodies	Reason For Listing	Proximity to the IPM Program Area
Llagas Creek	Water temperature and pH issues due to unknown sources	Passes through the Rancho Canada del Oro Open Space Preserve, Mount Chual Preserve, and Upper Uvas Creek Preserve
Coyote Creek	Diazinon, trash, and toxicity issues from unknown sources	Passes through Palassou Ridge Preserve
Uvas-Carnadero Creek	Water temperature and pH issues due to unknown sources	Passes through Little Uvas Creek Preserve, Upper Uvas Creek Preserve
Pajaro River	▸ Boron, chlordane, chloride, chromium, dichlorodiphenyldichloroethane (DDD), dichlorodiphenyldichloroethylene (DDE), dichlorodiphenyltrichloroethane (DDT), dieldrin, Escherichia coli (E. coli), dissolved oxygen, polychlorinated biphenyls (PCBs), sodium, toxicity, turbidity, and pH issues from unknown sources ▸ Chlorpyrifos and diazinon contamination from agriculture ▸ Fecal coliform contamination from collection system failure, domestic animals/livestock, and urban runoff/storm sewers ▸ Nitrate contamination from agriculture, domestic animals/livestock, and natural sources ▸ Sedimentation/siltation issues from agriculture, domestic animals/livestock, grazing-related sources, habitat modification, highway/road/bridge construction, hydromodification, land development, logging road construction/maintenance, urban runoff/storm sewers	50 ft southeast of the Pajaro River Agriculture Preserve
Almaden Reservoir	Mercury contamination due to unknown sources	50 ft north of the Rancho Canada del Oro Open Space Preserve
Jones Creek/ Furlong Creek	▸ E. coli, nitrate, and turbidity issues from unknown sources ▸ Fecal coliform collection system failure, domestic animals/livestock, urban runoff/storm sewers	25 ft north and south of the two segments of the Pajaro River Agriculture Preserve

Source: SWRCB 2017a; 2017b

Groundwater Quality

Groundwater quality can be affected by many things, but the chief controls on the characteristics of groundwater quality are the source and chemical composition of recharge water, properties of the host sediment, and history of discharge or leakage of pollutants. As discussed above, the Gilroy-Hollister Valley Groundwater Basin and the Santa Clara Valley Groundwater Basin underlay small portions of the IPM Program Area. The quality of groundwater within the Gilroy-Hollister Valley Groundwater Basin is characterized as highly mineralized with marginal water quality for drinking and agricultural purposes. The mineralized water quality is typical of other relatively small Coast Range groundwater basins and reflects the geologic formations in the Central Coast watersheds (e.g., marine sediments) and the relatively low permeability of groundwater basin sediments, which leads to long contact time with groundwater (San Benito County Water District 2019).

Groundwater in the Santa Clara Groundwater Basin is typically of very good quality, although some areas in the shallow aquifers adjacent to salt ponds and tidal creeks near San Francisco Bay have been affected by salt water intrusion (SCVWD 2016a). The Priority Basin Project of the Groundwater Ambient Monitoring and Assessment (GAMA) study was conducted for the 620-square mile San Francisco Bay study unit, which includes the Santa Clara Valley groundwater basin. This study tested raw water samples for a variety of organic and inorganic constituents. Fourteen volatile organic compounds (VOCs) and six pesticides were detected in the wells sampled; however, all detections of VOCs and pesticides in study area wells were below health-based thresholds, and most were less than one-tenth of the threshold values (USGS 2009).

FLOOD HAZARDS

The Pacific Ocean is located approximately 8.8 miles east of the nearest IPM Program Area preserve and is separated by the Santa Cruz Mountain Range. Thus, a tsunami would not be capable of reaching IPM Program Area preserves. According to Santa Clara County's General Plan, flood hazard areas within the county are located within the city of San Jose and in areas near existing creeks and streams (Santa Clara County 1994). As shown in Table 3.5-2 and Figure 3.5-2, many creeks occur in the IPM Program Area.

A seiche occurs when strong wind events or rapid changes in atmospheric pressure push water from one end of a body of water to the other (NOAA 2019). These typically occur in large bodies of water such as lakes or reservoirs. Three reservoirs are located adjacent to IPM Program Area preserves: the 635-acre Coyote Reservoir located immediately west of a portion of the Palassou Ridge Open Space Preserve; the 62-acre Almaden Reservoir located immediately north of portions of the Rancho Canada del Oro Open Space Preserve; and the 1,271-acre Anderson Reservoir located southeast of Coyote Ridge Open Space Preserve and east of North Coyote Valley Open Space Preserve. The Coyote Reservoir has been determined to be capable of producing a seiche (DOC 1973). While no information regarding seiche potential on the Almaden Reservoir is available, it has been designated a high hazard dam due to the number of people living in the potential flood zone downstream. The Santa Clara Valley Water District (SCVWD) is currently working to improve the seismic safety of the reservoir (SCVWD 2019a).

The majority of the North Coyote Valley Open Space Preserve is within the inundation area for the Anderson Dam (2016b). SCVWD is implementing the Anderson Dam Seismic Retrofit Project to retrofit and strengthen the dam against potential earthquake damage and dam failure (SCVWD 2018). Efforts to retrofit the Anderson Dam began in 2014 and are expected to be complete in 2031. The project includes seismically retrofitting the dam embankment; replacing the existing outlet pipe that runs below the dam; replacing a major section of the concrete spillway and raising the wall height 9 feet; and increasing the height of the dam crest by 7 feet to provide more freeboard for runoff from larger storms (SCVWD 2018).

3.5.3 Environmental Impacts and Mitigation Measures

METHODOLOGY

Evaluation of potential hydrologic and water quality impacts is based on a review of existing documents and studies that address water resources in the vicinity of the IPM Program Area. Information obtained from these sources was reviewed and summarized to describe existing conditions and to identify potential environmental effects, based on the standards of significance presented in this section. In determining the level of significance, the analysis assumes that the IPM Program would comply with relevant federal, state, and local laws, ordinances, and regulations and account for the influence of relevant EPMs, which are incorporated into IPM treatment design.

THRESHOLDS OF SIGNIFICANCE

An impact on hydrology or water quality is considered significant if implementation of the IPM Program would do any of the following:

- violate any water quality standards or waste discharge requirements or otherwise substantially degrade surface or ground water quality;
- substantially decrease groundwater supplies or interfere substantially with groundwater recharge such that the project may impede sustainable groundwater management of the basin;
- substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner that would;
  - result in substantial erosion or siltation on- or off-site;
  - result in flooding on-site or off-site;
  - create or contribute runoff water that would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff;
  - impede or redirect flood flows;
- in flood hazard, tsunami, or seiche zones, risk release of pollutants due to project inundation; and/or
- conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan.

ISSUES NOT DISCUSSED FURTHER

Implementation of the IPM Program would not create any impervious surfaces, so no interference with groundwater recharge would occur. Implementation of the IPM Program would also not decrease groundwater supplies through extraction, because it would not include activities or the construction of facilities that would draw on groundwater. Therefore, issues related to groundwater supplies and groundwater management are not discussed further.

Mechanical treatments that could disturb large areas of soil, such as discing and cultivation, could alter existing drainage patterns if conducted in areas such as near a stream or river where drainage typically occurs. However, discing and cultivation would only occur in agricultural preserves where land has been previously disturbed by agricultural cultivation; therefore, discing and cultivating these areas would not result in alterations of natural drainage patterns. No other IPM treatment activities would disturb soils to an extent that could alter existing drainage (e.g., digging by hand, cutting vegetation). Therefore, no related impacts, such as erosion and siltation, on or offsite flooding, contributing additional runoff to stormwater drainage systems, or impeding or redirecting flood flows would occur. Therefore, these issues are not discussed further.

The IPM Program is not located within a tsunami hazard zone. In the unlikely event of a seiche at the Coyote Reservoir, it would only inundate the margins of the reservoir and given that steep slopes rise quickly in the direction of the Palassou Open Space Preserve, substantial inundation would not occur (DOC 1973). Flood inundation in the event of a dam failure has been mapped for the Almaden Reservoir and indicates that flood waters would move northeast and away from the Rancho Canada del Oro Open Space Preserve and toward the city of San Jose (SCVWD 2019b). Furthermore, given that the Almaden Reservoir is a relatively small body of water at 62 surface acres, the likelihood of a large seiche capable of inundating areas outside of the margins of the reservoir is extremely low. The North Coyote Valley Open Space Preserve is within the inundation area for the Anderson Dam; however, the preserve is small relative to the overall size of the total IPM Program Area (less than 2 percent of the overall Program Area) and no substantial quantities of hazardous materials would be used on the preserve and risks associated with release of pollutants from inundation are minimal. In addition, SCVWD is currently retrofitting the dam to prevent dam failure, as a result, the potential for inundation from dam failure or a seiche will likely be further minimized. Accordingly, no substantial inundation of the IPM Program Area by dam failure, a seiche, or tsunami would result, and these issues are not discussed further.

ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

Impact 3.5-1: Potential to Violate Water Quality Standards or Waste Discharge Requirements, Substantially Degrade Surface or Ground Water Quality, or Conflict with or Obstruct the Implementation of a Water Quality Control Plan Through Manual or Mechanical IPM Treatment Activities

The proposed IPM Program includes manual and mechanical treatment activities for invasive plant and wildlife control in the IPM Program Area. Manual treatment activities would generally not result in substantial ground disturbance that could result in adverse effects to water quality. Certain treatments, such as mulching and application of weedmats, would use organic materials and fabrics or plastics. Although mulches are made of organic materials, weedmats could result in an introduction of inorganic materials to water bodies, if in the immediate vicinity. Mechanical IPM treatments, such as mowing/cutting and cultivation, could disturb soils and contribute to runoff into surface waters. In addition, mechanical equipment uses gasoline, diesel fuel, and oils, which have the potential to leak or spill and enter nearby water bodies in runoff. EPMs would be implemented to minimize the potential impacts to water quality, including requiring surveys for aquatic habitat and prohibiting mechanical equipment use within 15 feet of aquatic resources (EPM BIO-1), and requiring daily equipment checks for leaking equipment when in use and prompt removal if a leak is found (EPM HAZ-1). Recognizing the environmental protections of the EPMs, potential impacts to water quality and associated conflicts with the San Francisco Bay and Central Coast RWQCBs' Basin Plans from manual and mechanical IPM treatment activities would be **less than significant**.

Manual treatments under the IPM Program include prevention, sanitation, pulling, digging, hoeing, physical barriers/exclusion, covering/tarping, crop rotation, soil sterilization, mulching, weedmats, release of biocontrol insects, trapping, gigging, shooting, and electrical currents. Most of these activities would have very limited potential to degrade water quality as they would be done by hand and not substantially disturb soils or leave any new material in the environment. Activities such as mulching and application of weedmats use materials such as straw, wood chips, fabrics, or plastics that could enter nearby water bodies through wind or runoff. Mulches are made up of organic materials and thus would not result in substantial degradation of water quality; however, weedmats are made up of non-organic fabrics, plastics, or rubbers. These materials, if they enter surface waters, could degrade water quality. However, weedmats are typically interwoven solid sheets of material that are designed to persist as a solid sheet when used to minimize weed growth. The likelihood of a weedmat contributing significant pieces of material into the environment is extremely low.

Mechanical treatments under the IPM Program involve the use of motorized equipment, including mowing/cutting, cultivation, discing, girdling/frilling/drilling, and green flaming. Vegetation removal activities within the IPM Program Area could loosen and disturb soils, remove ground surface litter in some areas exposing the soil surface and facilitating erosion, and compact soils so that they are not able to infiltrate or filter runoff. Some <u>IPM</u> activities, such as cultivation~~, or~~ discing<u>, and rodent burrow removal</u>, would loosen soils at depths several inches below the soil surface. Rain of sufficient intensity and duration could dislodge soil particles, generate runoff, and cause localized erosion which could enter nearby water bodies. Mechanical treatments could also result in water quality impacts if gasoline, diesel fuel, lubricating oils, or grease that are used to operate machinery enter the environment and end up in waterbodies through runoff. EPM BIO-1 requires pre-treatment surveys for aquatic habitat and prohibits ground disturbing mechanical treatments within 15 feet of aquatic features. This buffer would help to filter and slow runoff from adjacent treatment areas, allow infiltration of stormwater into the ground, and trap sediment that could otherwise be carried into surface waters. In addition, per EPM HAZ-1, all mechanical equipment would be maintained per manufacturer's specification and in compliance with all state and federal requirements. The Authority (or contractors) would be required to inspect all equipment for leaks every day that equipment is in use, and any equipment found leaking would be promptly removed from a given treatment site. Therefore, the risk of substantial degradation to water quality and associated conflicts with the Basin Plan from manual and mechanical treatments would be avoided and minimized through EPMs and this impact would be **less than significant**.

Impact 3.5-2: Potential to Violate Water Quality Standards or Waste Discharge Requirements, Substantially Degrade Surface or Ground Water Quality, or Conflict with or Obstruct the Implementation of a Water Quality Control Plan Through Chemical IPM Treatment Activities

Chemical IPM treatment activities under the proposed IPM Program would include the use of insecticides, a rodenticide, herbicides, and a fumigant. These chemicals have the potential to contaminate surface or groundwater quality if used in close proximity to surface waters, spilled, or used under the wrong conditions. Because the fumigant and the majority of the insecticides and rodenticides would be used in structures and buildings and delivered through tamper proof bait stations, the likelihood of these entering the environment and degrading water quality is low. The proposed IPM Program would address concerns related to the use of herbicides by ensuring that herbicides are applied according to the manufacturer's label directions and consistent with EPMs HAZ-4, HAZ-5, and BIO-1 which protect surface and groundwaters, control drift, and ensure proper storage, handling, and cleanup. Because these protective measures would be implemented into treatment design, risk of substantial degradation to water quality and associated conflicts with San Francisco Bay and Central Coast RWQCBs' Basin Plans from herbicide use would be reduced such that this impact would be **less than significant.**

Chemical treatments under the IPM Program would include the use of herbicides, insecticides, rodenticides, and fumigants, and are summarized in Table 2-3 in Chapter 2, "Program Description." As described in Section 2.7.1, "IPM Treatment Types," careful and judicious use of pesticides are an essential component of the proposed IPM Program, in which the most effective, least toxic treatment options would be used to control pests. The potential for pesticides to adversely affect water quality varies by pesticide type.

Insecticides, Rodenticides, and Fumigants

Insecticide baits would be used in structures and buildings in tamper-proof bait stations and sprays would be used as a last resort and target specific individuals or populations (e.g., problem wasp nests). Rodenticides are not currently used by the Authority and would also be used as a last resort to control pest infestations that create threats to human health or safety after other non-chemical treatment options are exhausted. If deemed necessary, rodenticides would only be used in structures and buildings in tamper-proof anchored bait containers to avoid non-target species interactions. Because most of the insecticides and rodenticides would be used in structures and buildings and delivered through tamper proof bait stations, and sprays would be used as a last resort to target specific individuals (such as a wasp's nest), the likelihood of these entering the environment and degrading water quality is extremely low.

Fumigation would be used to control termite infestations within affected structures, if necessary. The entire fumigation process, including the handling of the fumigant, would be implemented by certified applicators and the treated structure would be securely sealed with a tent to trap the gas inside during and following application. After fumigation is complete, the tenting would be removed from the structure to air out the building. The fumigant is a gas that dissipates quickly in air and would not leach into groundwater during this process. Therefore, the potential for the fumigant to enter the environment and degrade water quality would be extremely low.

Herbicides

In general, the use of herbicides could move off-site through runoff, leaching, drift, and misapplication or spills. Surface water can be affected by any of these means, but only leaching has the potential to degrade groundwater. Site conditions, chemical characteristics, and application technique are other factors that can influence how likely an herbicide is to degrade water quality. The first line of protection for water quality is the herbicide product label. Not all herbicides act the same way in the environment; some are active for only a short time while others may persist for years, they also have varying degrees of water solubility and soil sorption. Additionally, each herbicide may have several formulations for specific uses. Because of this complexity, each herbicide product carries a legally enforceable label which provides critical information about product use. Before an herbicide can be registered for sale, EPA requires extensive scientific data on the potential health and environmental effects. EPA evaluates the data and ensures that that label describes a set of conditions, directions, and precautions that define how and where the product can be safely used. Following the directives of the product label greatly reduces the potential for herbicides to be applied in a way that contaminates water resources.

The potential for herbicide leaching and runoff contamination is dependent on the available water in the soil, the soils permeability, the proximity to surface or groundwater, and the length of time that the herbicide remains active in the environment. Herbicides applied near aquatic resources, to wet soil, areas of shallow groundwater, or applied when significant precipitation is expected are more likely to be problematic. EMP HAZ-5 requires that no herbicide be applied during precipitation or if precipitation is forecasted within 6 hours, except for herbicides that are specially formulated for use in wet conditions. This rain-free window is extended to 24 hours within 100 feet of aquatic resources (i.e., surface waters, wetlands, seasonal streams, or locations where groundwater is present at the soil surface). Some formulations may require longer precipitation-free windows, as required by the label. In addition, EPM BIO-1 and HAZ-5 prohibit the use of broadcast spraying of herbicides within 50 feet of any aquatic resources, except for herbicides registered for use in aquatic systems. EPM BIO-1 and HAZ-5 further prohibit the use of all other chemical treatments within 15 feet of aquatic features. EPM BIO-8 expands on EPM BIO-1 and HAZ-5 by prohibiting herbicide application within 60 feet of aquatic areas designated as California red-legged frog critical habitat. These precautions would limit the potential for herbicides to leach into groundwater, contaminate stormwater runoff, or be carried into surface waters.

Herbicides can reach water through drift, the airborne movement of herbicides beyond the treatment area. The risk of drift is affected by the application technique and weather conditions. Aerial or boom applications are most likely to reach surface waters through drift because the herbicide must settle through the air to reach the treatment area. Spot and localized treatments are less likely to drift because these applications are targeted at specific plants and less herbicide is applied. The proposed IPM Program does not include aerial application of herbicides. Broadcast applications of herbicide using a boom applicator attached to an all-terrain vehicle (ATV) could take place along roadways and large infestations that are accessible by ATV. EPM HAZ-5 prohibits spray applications of herbicides when wind speeds are 7 miles per hour or greater, when temperatures exceed 85 degrees Fahrenheit, and requires applicators to use low impact and low volume spray applications with the largest and coarsest droplet size to minimize drift. These protections would reduce the potential for spray applications to drift from a treatment area and reach surface waters.

Although the protections described above would prevent impacts to water quality during herbicide application, the accidental misapplication or spill of an herbicide could degrade water quality. EPM HAZ-4 requires that Authority staff comply with all federal, state, and local pesticide laws and regulations; prohibits spray tanks from being left unattended during filling to minimize spills; requires that all herbicides and herbicide containers are lawfully stored, handled, and disposed of in accordance with the specific pesticide label and in a manner that would prevent water contamination; and requires any pesticide spills to be cleaned up immediately. Additionally, as described in Section 2.7.1, "IPM Treatment Types," the Authority would evaluate herbicide characteristics and choose the least toxic treatment option that will effectively control the invasive plant, thereby reducing the quantity of high-risk chemicals used in the IPM Program Area. These protections would ensure proper handling of herbicides and reduce the potential for misapplication or spill of treatment chemicals.

Conclusion

The IPM Program includes the use of pesticides, which have the potential to contaminate surface or groundwater quality if applied near waters, misapplied, spilled, or used under the wrong conditions. The fumigant and the majority of the insecticides and rodenticides would be used in structures and buildings and would be contained, either by tenting or through tamper proof bait stations. Additionally, spray insecticides would be used as a last resort to target specific individuals (such as a wasp's nest). Therefore, the likelihood of these pesticides entering the environment and degrading water quality is extremely low. The IPM Program would address concerns related to the use of herbicides by ensuring that herbicides are applied according to the manufacturer's label directions and consistent with EPMs that protect surface and groundwaters, control drift, and ensure proper storage, handling, and cleanup. With these measures in place, the risk of substantial degradation to water quality and associated conflicts with the San Francisco Bay or Central Coast RWQCB's Basin Plans for the chemical IPM treatment activities would be reduced, and this impact would be **less than significant**.

Impact 3.5-3: Potential to Release Substantial Pollutants due to Flooding

The IPM Program Area has the potential to be inundated in the areas near creeks in the event of a flood. However, quantities of pollutants would not be substantially increased over existing levels and present in the IPM Program Area because potentially hazardous materials would only be stored in designated locations that are currently used for materials storage; equipment would be inspected daily for leaks to prevent gasoline, diesel fuel, lubricating oils, or grease from entering the environment (EPM HAZ-1); and only pesticides registered for aquatic use would be used within 50 feet of aquatic resources or within 100 feet of aquatic resources when precipitation is forecasted within 24 hours (EPM HAZ-5 and BIO-1). Furthermore, the Santa Clara County General Plan indicates that there is only a one percent chance of a flood occurring each year that would be capable of creating substantial flooding along creeks (Santa Clara County 1994); therefore, the risk of a flood that could inundate the IPM Program Area is low. Lastly, IPM activities would only increase by a few additional treatments over current levels under the IPM Program, which would not result in a substantial increase in the presence of potential pollutants in the IPM Program Area. Therefore, this impact would be **less than significant**.

Certain areas of the IPM Program Area could be inundated due to flooding in and around creeks, which could release pollutants if present. The Authority would only store potentially hazardous materials or other potential pollutants within a few designated structures in the IPM Program Area including the Authority's field offices on the Rancho Canada del Oro Open Space Preserve and Sierra Vista Open Space Preserve, which are currently used for hazardous material storge for existing IPM activities. Furthermore, as discussed above in Impact 3.5-1, the Authority (or contractors) would be required to inspect all equipment for leaks every day that equipment is in use, and any equipment found leaking would be promptly removed from a given treatment site per EPM HAZ-1. Therefore, no substantial quantities of gasoline, diesel fuel, lubricating oils, or grease that are used to operate machinery would be present in the IPM Program Area.

As described above in Impact 3.5-2, pesticides would be used in the IPM Program Area, including the use of insecticides and rodenticides in and around buildings and structures, and a fumigant would be used, if needed, to treat termite infestations within affected structures. Herbicides would be used to treat invasive vegetation. Given that herbicides could be used broadly throughout the IPM Program, there is a potential for release if a flood were to occur along a creek in the IPM Program Area. However, per EPM BIO-1 and HAZ-5, only broadcast spraying of herbicides registered for aquatic use would be used within 50 feet of aquatic resources, including creeks and streams. Furthermore, no herbicides would be used within 100 feet of streams when rain is forecasted within 24 hours per EPM HAZ-5, which would minimize the presence of herbicides in areas adjacent to existing streams particularly when flooding is more likely (i.e., during precipitation events). In addition, the Santa Clara County General Plan indicates that there is only a one percent chance of a flood occurring each year that would be capable of creating flooding along creeks in the county (Santa Clara County 1994); therefore, the risk of flooding and associated inundation of the IPM Program Area is low. Furthermore, IPM treatment activities would only increase by a few additional simultaneous treatments under the IPM Program, which would not result in a substantial increase in the presence of potential pollutants in the IPM Program Area. Therefore, this impact would be **less than significant**.

3.6 CULTURAL AND TRIBAL CULTURAL RESOURCES

This section evaluates the effects of the proposed IPM Program on cultural and tribal cultural resources. The following analysis considers known and unknown cultural and tribal cultural resources, and the how the proposed IPM Program could affect those resources. This section also provides background and context on cultural and tribal cultural resource concepts and regulations.

One comment letter regarding cultural resources was received in response to the Notice of Preparation (see Appendix A). The Native American Heritage Commission (NAHC) requested Assembly Bill 52 (AB 52) and Senate Bill 18 (SB 18) compliance information. Details about AB 52 compliance associated with the IPM Program is described below in Section 3.6.2, "Environmental Setting." SB 18 does not apply to the IPM Program because there are no general plan amendments required under the IPM Program (which is the trigger for SB 18 compliance).

3.6.1 Regulatory Setting

FEDERAL

Section 106 of the National Historic Preservation Act

Federal protection of resources is legislated by (a) the National Historic Preservation Act (NHPA) of 1966 as amended by 16 U.S. Code 470, (b) the Archaeological Resource Protection Act of 1979, and (c) the Advisory Council on Historical Preservation. These laws and organizations maintain processes for determination of the effects on historical properties eligible for listing in the National Register of Historic Places (NRHP).

Section 106 of the NHPA and accompanying regulations (36 Code of Federal Regulations [CFR] Part 800) constitute the main federal regulatory framework guiding cultural resources investigations and require consideration of effects on properties that are listed in, or may be eligible for listing in the NRHP. The NRHP is the nation's master inventory of known historic resources. It is administered by the National Park Service and includes listings of buildings, structures, sites, objects, and districts that possess historic, architectural, engineering, archaeological, and cultural districts that are considered significant at the national, state, or local level.

The formal criteria (36 CFR 60.4) for determining NRHP eligibility are as follows:

1. The property is at least 50 years old (however, properties under 50 years of age that are of exceptional importance or are contributors to a district can also be included in the NRHP);
2. It retains integrity of location, design, setting, materials, workmanship, feeling, and associations; and
3. It possesses at least one of the following characteristics:

   Criterion A Association with events that have made a significant contribution to the broad patterns of history (events).

   Criterion B Association with the lives of persons significant in the past (persons).

   Criterion C Distinctive characteristics of a type, period, or method of construction, or represents the work of a master, or possesses high artistic values, or represents a significant, distinguishable entity whose components may lack individual distinction (architecture).

   Criterion D Has yielded, or may be likely to yield, information important to prehistory or history (information potential).

Listing in the NRHP does not entail specific protection or assistance for a property but it does guarantee recognition in planning for federal or federally-assisted projects, eligibility for federal tax benefits, and qualification for federal historic preservation assistance. Additionally, project effects on properties listed in the NRHP must be evaluated under CEQA.

Secretary of the Interior's Standards

The *Secretary of the Interior's Standards for the Treatment of Historic Properties* (Secretary's Standards) provide guidance for working with historic properties and are used by lead agencies to evaluate proposed rehabilitative work on historic properties. The Secretary's Standards are a useful analytic tool for understanding and describing the potential impacts of proposed changes to historic resources. Projects that comply with the Secretary's Standards benefit from a regulatory presumption that they would not result in a significant impact to a historic resource. In 1992 the Secretary's Standards were revised so they could be applied to all types of historic resources, including landscapes. They were reduced to four sets of treatments to guide work on historic properties: preservation, rehabilitation, restoration, and reconstruction. The four distinct treatments are defined as follows:

- Preservation focuses on the maintenance and repair of existing historic materials and retention of a property's form as it has evolved over time.
- Rehabilitation acknowledges the need to alter or add to a historic property to meet continuing or changing uses while retaining the property's historic character.
- Restoration depicts a property at a particular period of time in its history, while removing evidence of other periods.
- Reconstruction re-creates vanished or non-surviving portions of a property for interpretive purposes.

STATE

California Register of Historical Resources

All properties in California that are listed in or formally determined eligible for listing in the NRHP are eligible for the CRHR. The CRHR is a listing of State of California resources that are significant within the context of California's history. The CRHR is a statewide program of similar scope and with similar criteria for inclusion as those used for the NRHP. In addition, properties designated under municipal or county ordinances are also eligible for listing in the CRHR. A historic resource must be significant at the local, state, or national level under one or more of the criteria defined in the California Code of Regulations Title 15, Chapter 11.5, Section 4850 to be included in the CRHR. The CRHR criteria are similar to the NRHP criteria and are tied to CEQA because any resource that meets the criteria below is considered a significant historical resource under CEQA. Similar to the NRHP, a resource must meet one of the below four criteria and retain integrity.

1. Is associated with events or patterns of events that have made a significant contribution to the broad patterns of local or regional history, or the cultural heritage of California or the United States.
2. Is associated with the lives of persons important to local, California, or national history.
3. Embodies the distinctive characteristics of a type, period, region, or method of construction, or represents the work of a master, or possesses high artistic values.
4. Has yielded, or has the potential to yield, information important to the prehistory or history of the local area, California, or the nation.

Assembly Bill 52

AB 52, signed by the California Governor in September of 2014, established a new class of resources under CEQA: "tribal cultural resources," defined in Public Resource Code (PRC) 21074. Pursuant to PRC Sections 21080.3.1, 21080.3.2, and 21082.3, lead agencies undertaking CEQA review must, upon written request of a California Native American Tribe, begin consultation before the release of an environmental impact report, negative declaration, or mitigated negative declaration.

PRC Section 21080.3.2 states:

> Within 14 days of determining that a project application is complete, or to undertake a project, the lead agency must provide formal notification, in writing, to the tribes that have requested notification of proposed projects in the lead agency's jurisdiction. If it wishes to engage in consultation on the project, the tribe must respond to the lead agency within 30 days of receipt of the formal notification. The lead agency must begin the consultation process with the tribes that have requested consultation within 30 days of receiving the request for consultation. Consultation concludes when either: 1) the parties agree to measures to mitigate or avoid a significant effect, if a significant effect exists, on a tribal cultural resource, or 2) a party, acting in good faith and after reasonable effort, concludes that mutual agreement cannot be reached.

If the lead agency determines that a project may cause a substantial adverse change to a tribal cultural resource, and measures are not otherwise identified in the consultation process, provisions under PRC Section 21084.3 (b) describe mitigation measures that may avoid or minimize the significant adverse impacts.

California Environmental Quality Act

CEQA requires public agencies to consider the effects of their actions on "historical resources," "unique archaeological resources," and "tribal cultural resources." Pursuant to PRC Section 21084.1, a "project that may cause a substantial adverse change in the significance of an historical resource is a project that may have a significant effect on the environment." Section 21083.2 requires agencies to determine whether projects would have effects on unique archaeological resources.

Historical Resources

"Historical resource" is a term with a defined statutory meaning (PRC, Section 21084.1; determining significant impacts to historical and archaeological resources is described in the State CEQA Guidelines, Sections 15064.5[a] and [b]). Under State CEQA Guidelines Section 15064.5(a), historical resources include the following:

1. A resource listed in, or determined to be eligible by the State Historical Resources Commission, for listing in the CRHR (PRC, Section 5024.1).
2. A resource included in a local register of historical resources, as defined in Section 5020.1(k) of the PRC or identified as significant in a historical resource survey meeting the requirements of Section 5024.1(g) of the Public Resources Code, will be presumed to be historically or culturally significant. Public agencies must treat any such resource as significant unless the preponderance of evidence demonstrates that it is not historically or culturally significant.
3. Any object, building, structure, site, area, place, record, or manuscript which a lead agency determines to be historically significant or significant in the architectural, engineering, scientific, economic, agricultural, educational, social, political, military, or cultural annals of California may be considered to be a historical resource, provided the lead agency's determination is supported by substantial evidence in light of the whole record. Generally, a resource will be considered by the lead agency to be historically significant if the resource meets the criteria for listing in the CRHR (PRC Section 5024.1).
4. The fact that a resource is not listed in or determined to be eligible for listing in the CRHR, not included in a local register of historical resources (pursuant to Section 5020.1(k) of the PRC), or identified in a historical resources survey (meeting the criteria in Section 5024.1(g) of the PRC) does not preclude a lead agency from determining that the resource may be an historical resource as defined in PRC Section 5020.1(j) or 5024.1.

Unique Archaeological Resources

CEQA also requires lead agencies to consider whether projects will impact unique archaeological resources. Public Resources Code, Section 21083.2, subdivision (g), states that unique archaeological resource means an archaeological artifact, object, or site about which it can be clearly demonstrated that, without merely adding to the current body of knowledge, there is a high probability that it meets any of the following criteria:

1. Contains information needed to answer important scientific research questions and that there is a demonstrable public interest in that information.

2. Has a special and particular quality such as being the oldest of its type or the best available example of its type.
3. Is directly associated with a scientifically recognized important prehistoric or historic event or person.

Tribal Cultural Resources

CEQA also requires lead agencies to consider whether projects will impact tribal cultural resources. PRC Section 21074 states the following:

a) "Tribal cultural resources" include:
   1) Sites, features, places, cultural landscapes, sacred places, and objects with cultural value to a California Native American tribe that are either of the following:
      A) Included or determined to be eligible for inclusion in the CRHR.
      B) Included in a local register of historical resources as defined in subdivision (k) of Section 5020.1.
   2) A resource determined by the lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in subdivision (c) of Section 5024.1. In applying the criteria set forth in subdivision (c) of Section 5024.1 for the purposes of this paragraph, the lead agency shall consider the significance of the resource to a California Native American tribe.

b) A cultural landscape that meets the criteria of subdivision (a) is a tribal cultural resource to the extent that the landscape is geographically defined in terms of the size and scope of the landscape.

c) A historical resource described in Section 21084.1, a unique archaeological resource as defined in subdivision (g) of Section 21083.2, or a "nonunique archaeological resource" as defined in subdivision (h) of Section 21083.2 may also be a tribal cultural resource if it conforms with the criteria of subdivision (a).

California Native American Historical, Cultural, and Sacred Sites Act

The California Native American Historical, Cultural, and Sacred Sites Act applies to both public and private lands. The Act requires that upon discovery of human remains, construction or excavation activity cease and the County coroner be notified. If the remains are of a Native American, the coroner must notify the NAHC, which notifies and has the authority to designate the most likely descendant (MLD) of the deceased. The Act stipulates the procedures the descendants may follow for treating or disposing of the remains and associated grave goods.

Health and Safety Code, Sections 7050.5 and 7052

Section 7050.5 of the Health and Safety Code requires that construction or excavation be stopped in the vicinity of discovered human remains until the coroner can determine whether the remains are those of a Native American. If determined to be Native American, the coroner must contact the NAHC. Section 7052 states that the disturbance of Native American cemeteries is a felony.

Public Resources Code, Section 5097

PRC Section 5097 specifies the procedures to be followed in the event of the unexpected discovery of human remains on nonfederal land. The disposition of Native American burial falls within the jurisdiction of the NAHC. Section 5097.5 of the Code states the following:

> No person shall knowingly and willfully excavate upon, or remove, destroy, injure, or deface any historic or prehistoric ruins, burial grounds, archaeological or vertebrate paleontological site, including fossilized footprints, inscriptions made by human agency, or any other archaeological, paleontological or historical feature, situated on public lands, except with the express permission of the public agency having jurisdiction over such lands. Violation of this section is a misdemeanor.

LOCAL

Santa Clara County General Plan

The Santa Clara County General Plan contains the following strategies and policies related to heritage resources in the Resource Conservation chapter that are applicable to the IPM Program (Santa Clara County 1994a):

- Policy C-RC 49: Cultural heritage resources within Santa Clara County should be preserved, restored wherever possible, and commemorated as appropriate for their scientific, cultural, historic and place values.
- Policy C-RC 52: Prevention of unnecessary losses to heritage resources should be ensured as much as possible through adequate ordinances, regulations and standard review procedures. Mitigation efforts, such as relocation of the resource should be employed where feasible when projects will have significant adverse impact upon heritage resources.
- Policy C-RC 54: Heritage resources should be restored, enhanced, and commemorated as appropriate to the value and significance of the resource.

Santa Clara County Ordinance Code

Title B (Regulations), Division B6 of the Santa Clara County Ordinance Code includes regulations regarding cemeteries and Indian burial grounds. Sections B6-18 through B6-20 describe specific requirements related to discovering or unearthing burial sites, including the process for contacting the NAHC, pursuant to Health and Safety Code Section 7050.5(c), site inspection, and removal and reburial.

City of Morgan Hill General Plan

The Morgan Hill 2035 General Plan contains goals and policies related to cultural and historic resources, in the Healthy Community Element of the General Plan (City of Morgan Hill 2016). The following goals and policies are relevant to the IPM Program:

GOAL HC-8: Historic identity and cultural resources that are preserved for future generations.

- Policy HC-8.1: Identify and Protect Resources. Identify and protect heritage resources from loss and destruction. (South County Joint Area Plan 15.09)
- Policy HC-8.2: Historic Structures. Encourage the preservation and rehabilitation of the City's historic structures.
- Policy HC-8.5: Mitigation. Require that if cultural resources, including tribal, archaeological, or paleontological resources, are uncovered during grading or other on-site excavation activities, construction shall stop until appropriate mitigation is implemented.

City of San Jose General Plan

The Envision San Jose 2040 General Plan contains the following policies related to cultural and tribal cultural resources that are relevant to the IPM Program (City of San Jose 2018):

GOAL ER-10: Archaeology and Paleontology. Preserve and conserve archaeologically significant structures, sites, districts, and artifacts in order to promote a greater sense of historic awareness and community identity.

3.6.2 Environmental Setting

The IPM Program is located in the San Francisco Bay Area and consists of 16,446 acres of land in 14 open space preserves ranging in size from 39 to more than 5,500 acres. The preserves are owned and managed by the Authority and are all within Santa Clara County. Definitions related to cultural resources, the cultural setting for the IPM Program Area, and the results of cultural records searches and AB 52 outreach that was conducted for the IPM Program are described below.

DEFINITIONS

Cultural resources include districts, sites, buildings, structures, or objects generally older than 50 years and considered to be important to a culture, subculture, or community for scientific, traditional, religious, or other reasons. They include archaeological resources and historic built or architectural resources. Archaeological resources are locations where human activity has measurably altered the earth or left deposits of prehistoric or historic-era physical remains (e.g., stone tools, bottles, former roads, house foundations). Historic (or architectural) resources include standing buildings (e.g., houses, barns, outbuildings, cabins) and intact structures (e.g., dams, bridges, roads, districts) that are 50 years or older.

Tribal cultural resources, as defined by AB 52, Statutes of 2014, in PRC Section 21074, include site features, places, cultural landscapes, sacred places or objects, which are of cultural value to a tribe. Refer to Section 3.6.1, "Regulatory Setting," for more information on these definitions.

CULTURAL RESOURCE SETTING

The first recorded settlement of the Santa Clara Valley was by the Ohlone around 250 AD. The Ohlone were a non-agricultural society, dependent on their surroundings for food and basic necessities. In 1769, the Moncado Party of Spanish explorers discovered the Santa Clara Valley by accident while searching for Monterey Bay. The initial Spanish settlements three years later were missions, presidios, and pueblos, colonized "to save the souls of Indians and to secure the territory against foreign intrusion" (Santa Clara County 1994b:5P1). The mission lands were secularized in the early 1800s and large land holdings were granted to prominent Mexican families between 1810 and 1840. A few English-speaking settlers came to Santa Clara Valley beginning in 1813; however, the first big wave of American pioneers (the Bidwell Party and the Stevens-Townsend party) did not arrive until the 1840s. Many archaeological sites in Santa Clara County are connected with the history of the Ohlone tribes. Native American burial sites and sacred sites are delicate resources because of their spiritual importance to Native American tribes still in the area.

Population in the Santa Clara Valley remained steady between 1844 and 1851, when discovery of gold in 1848 drew incoming pioneers to other parts of the state. In the meantime, families such as the Murphys took advantage of statehood, which ended the restriction of land ownership to Mexican citizens only, and began purchasing the Ranchos of the Castro, Hernandez, and Peralta families. Soon, Martin Murphy, Sr., owned most of the land between present-day Sunnyvale and Gilroy.

In 1864, the Central Railroad (now Southern Pacific) completed a line between San Francisco and San Jose. Several owners of large homesteads (including Martin Murphy's heirs) began selling 5 to 10 acre parcels for small ranches. Weather and soil conditions were superb for fruit and viticulture, and agricultural enterprises in the Santa Clara Valley flourished well into the 20th century. The industrialization of the northern Santa Clara Valley took place in the 1970s and 1980s. Development pressures resulting from the influx of the microchip and other high-technology industries caused the urbanization of much of the rural and agricultural land in that area.

Areas of Santa Clara Valley containing archaeological resources include the Isabel Valley Archaeological District, the Santa Teresa Archaeological District, the Circles Within Circles Archaeological District (near Morgan Hill), the Uvas Creek-Little Arthur Creek Archaeological District, the Upper and Lower Bodfish Creek Archaeological Districts, the Leavesley Road Alamias Creek Archaeological Area, and the Pacheco Pass Creek Archaeological District. Ohlone village sites have been identified in Gilroy and Los Altos Hills, and shell mounds in Mountain View and Milpitas. Two other archaeological sites, the Coyote Creek Archaeological District (National Register reference number 79002084) near Gilroy Hot Springs and Poverty Flat Site (National Register reference number 72000254) in Henry Coe State Park, are listed on the National Register.

Historic resources in Santa Clara County from the Mexican era include the Vacqueros Adobe Site and Hernandez Adobe in Los Gatos; Arroyo de San Jose (Juan Batista de Anza's encampment) in Cupertino; the Juan Prado Mesa Adobe site in Los Altos Hills; Palo Alto; Jose Alviso Adobe and Jose Higuera Adobe in Milpitas; the Mission Corral Site, Berryessa/Fernandez Adobe, Adobe Indian Dwelling, and Mission Santa Clara de Assisi in Santa Clara; and Peralta Adobe, Roberto-Sunol Adobe, the De Quevedo Adobe Site, and the first site of Pueblo de San Jose

Guadalupe in San Jose. Historic sites are clustered in unincorporated areas in and around San Jose and other cities in Santa Clara County. There are also clusters in the Los Gatos area, in the Coyote area near Metcalf Road, the settlement known as old Gilroy, the madrone area, the New Almaden historic district, Stanford University, Mt. Hamilton Road, and around the communities of Gilroy, San Martin, and Morgan Hill. Many of the historic sites listed are residences, but facilities range from windmills and tankhouses in the southern area of the county to Lick Observatory on Mt. Hamilton. The Gilroy Hot Springs spa buildings, William E. Riker's "Holy City" in Los Gatos, and several mines and other sites representing the area's industrial history.

KNOWN CULTURAL RESOURCES

On November 27, 2019, a records search for the IPM Program Area with a 0.05 mile buffer was conducted at the Northwest Information Center (NWIC), at California State University, Sonoma campus in Rohnert Park. All Authority lands as of late 2019 were included in the records search; however, North Coyote Valley was acquired by the Authority after the records search, so the research did not include this new preserve. The following information was reviewed as part of the records search:

- NRHP and CRHR,
- California Office of Historic Preservation Historic Property Directory,
- California Inventory of Historic Resources (1976),
- California State Historic Landmarks (1996 and updates),
- California Points of Historical Interest (1992 and updates),
- Archaeological Determinations of Eligibility for Santa Clara, and
- Historical United States Geological Survey Topographical Quadrangles.

The records search found 16 recorded cultural resources within the IPM Program Area, and an additional 7 cultural resources within 0.05 mile of the IPM Program Area (NIC 2019). The resources include a mix from the prehistoric and historic periods and include both archaeological and built/architectural resources. The resources are identified and described in Table 3.6-1 below. Given the sensitivity of cultural resources and to prevent potential looting of sites, specific locational information is not disclosed.

Table 3.6-1 Cultural Resources Recorded Within and Adjacent to the IPM Program Area

Primary Number	Trinomial	Description
P-43-120	CA-SCL-106	Permanent habitation site
P-43-160	CA-SCL-148/H	Bedrock mortar and dump site
P-43-178	CA-SCL-167	Lithic scatter
P-43-179	CA-SCL-168	Lithic scatter
P-43-216	CA-SCL-205	Lithic scatter
P-43-219	CA-SCL-208	Lithic scatter
P-43-347	CA-SCL-341	Ceremonial site
P-43-350	CA-SCL-344H	Leavesley/Dexter Mountain Ranch
P-43-352	CA-SCL-346H	Matthew's Ranch
P-43-362	CA-SCL-356	Chert quarry
P-43-363	CA-SCL-357	Chert quarry
P-43-370	CA-SCL-364H	Cottle House
P-43-452	CA-SCL-451	Habitation site with bedrock mortars and groundstone
P-43-480	CA-SCL-479H	Homestead remains

Primary Number	Trinomial	Description
P-43-481	CA-SCL-480H	Concrete structure
P-43-637	CA-SCL-719/H	Bedrock mortars and quarry pits
P-43-1436	NA	Burial site
P-43-2019	NA	Haskin-Ridge Cabin
P-43-2207	NA	Alum Park Historic District
P-43-2860	NA	Ellis Ranch and House
P-43-2861	NA	Two houses at 4960-4980 Frazier Lake Road
P-43-2886	NA	Mining site
P-43-3567	NA	Domestic refuse scatter

Source: NIC 2019

TRIBAL CULTURAL RESOURCES

In September 2019, the Authority requested a records search of the NAHC's Sacred Lands File (SLF) and a list of Native American tribes traditionally affiliated with the IPM Program Area. On October 3, 2019 the NAHC provided a positive response to the SLF request for known cultural resources within the IPM Program Area. The NAHC's letter advised the Authority to contact the Amah Mutsun Tribal Band for more information. The NAHC also provided a list and contact information for six additional Native American tribes who may have knowledge of cultural resources within the IPM Program Area and may have interest in the IPM Program.

On October 14, 2019, the Authority sent notifications pursuant to AB 52 regarding the proposed IPM Program via certified mail to the seven Native American tribal contacts provided by the NAHC. Letters were sent to the following tribes: Amah Mutsun Tribal Band, Amah Mutsun Tribal Band of Mission San Juan Bautista, Indian Canyon Mutsun Band of Costanoan, Muwekma Ohlone Indian Tribe of the San Francisco Bay Area, North Valley Yokuts Tribe, and the Ohlone Indian Tribe. No responses were received from any of the tribes and AB 52 consultation is considered complete.

3.6.3 Impacts and Mitigation Measures

METHODOLOGY

The impact analysis for cultural resources is based on the findings and recommendations of the *Cultural Resources Literature Review for the Santa Clara Valley Open Space Authority Integrated Pest Management Program* (NIC 2019), the results of the NAHC's SLF search, and outreach pursuant to AB 52. The analysis is also informed by the provisions and requirements of federal, state, and local laws and regulations that apply to cultural resources, including what constitutes a significant impact under CEQA. In addition, according to PRC Section 15126.4(b)(1), if a project adheres to the Secretary Standards for the Treatment of Historic Properties, the project's impacts to a historic resource "will generally be considered mitigated below the level of a significance and thus is not significant."

THRESHOLDS OF SIGNIFICANCE

Based on Appendix G of the State CEQA Guidelines, the IPM Program would result in a significant impact on cultural resources if it would:

- cause a substantial adverse change in the significance of a historical resource pursuant to Section 15064.5 of the State CEQA Guidelines;

- cause a substantial adverse change in the significance of an archaeological resource pursuant to Section 15064.5 of the State CEQA Guidelines;
- disturb any human remains, including those interred outside of dedicated cemeteries; or
- cause a substantial adverse change in the significance of a tribal cultural resource, defined in PRC Section 21074 as either a site, feature, place, cultural landscape that is geographically defined in terms of the size and scope of the landscape, sacred place, or object with cultural value to a California Native American tribe.

ISSUES NOT DISCUSSED FURTHER

No issues have been dismissed; all relevant impacts are discussed below.

ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

Impact 3.6-1: Potential to Cause a Substantial Adverse Change in the Significance of a Historic Resource

There are multiple previously recorded historic period resources within the IPM Program Area, and additional historic period resources may be present that have not been previously recorded. The IPM Program includes treatment activities that could alter existing buildings and structures within the IPM Program Area, such as through installing barriers to prevent pest entry and conducting building retrofits. Buildings and structures within the IPM Program receiving these treatments could be eligible for listing in the CRHR and therefore considered historic. Incorporating barriers or building retrofits to historic buildings or structures could change their historical significance. Therefore, this would be a **potentially significant** impact.

Based on the records search conducted for the IPM Program, there are multiple previously recorded historic period resources that occur within the IPM Program Area (NIC 2019), and there may be additional historic period resources in the IPM Program Area that have not been previously recorded. Additionally, the North Coyote Valley Open Space Preserve is a new property that was added to the Authority lands after the records search was conducted. This PEIR recognizes that this new preserve could also contain historic period resources, based on the evidence that resources could occur on other Authority lands within the region. These resources could be eligible for listing in the CRHR and therefore considered historic for the purposes of CEQA.

Manual, mechanical, and chemical IPM activities proposed under the IPM Program on natural lands, agricultural lands, recreational facilities, and vegetative rights-of-ways would not affect historic resources because historic resources are generally built resources, which would not be treated in these management categories. However, manual, mechanical, and chemical treatments would occur within and adjacent to buildings and structures to control pests. Treatment options for pest management related to buildings and structures involve prevention (e.g., keeping the inside of buildings clean and free of food), physical controls (e.g., filling cracks, pruning vegetation, using sticky or snap traps), habitat modifications (e.g., preventing entry through exclusion techniques and building retrofits, moving habitat/nests, ~~destroying~~ removing rodent burrows), and chemical control (e.g., use of insecticides or termite fumigation). Of these techniques, habitat modifications and prevention techniques could modify structures and buildings by installing exclusion features or conducting building retrofits. Because there are previously recorded historic period buildings and structures within the IPM Program Area, and there may be additional Authority structures and buildings that have not been recorded and may also be eligible for CHRP listing, these activities could affect the significance of a historical resource. Therefore, the impact would be **potentially significant**.

Mitigation 3.6-1: Built-Environment Survey

Before implementation of IPM treatment activities that could alter historic-age buildings or structures (50 years or older), the structures shall be surveyed by a qualified architectural historian who meets the Secretary's Standards. The structure will be evaluated for eligibility for listing on the CRHR. If the structure is evaluated and deemed not eligible for listing on the CRHR, IPM Program treatment activities may proceed. If structures are determined to be eligible for the CRHR, IPM Program activities will follow the Secretary's Standards for the Treatment of Historic Properties with Guidelines for Preserving, Rehabilitating, Restoring, and Reconstructing Historic Buildings, or the Secretary's Standards for Rehabilitation and Guidelines for Rehabilitating Historic Buildings. If the Authority is unable to implement the Secretary's Standards, then no building alterations to structures deemed eligible for listing on the CRHR shall occur.

Significance after Mitigation

Implementation of Mitigation Measure 3.6-1 would reduce the potential impacts to historic resources because it requires the evaluation of historic age structures and buildings before building alterations and implementation of professionally-accepted and legally-compliant procedures during IPM treatments to protect such resources if deemed historically significant. Therefore, this impact would be **less than significant after mitigation**.

Impact 3.6-2: Potential to Cause a Substantial Adverse Change in the Significance of Unique Archaeological Resources

Archaeological resources have been identified within the IPM Program Area, and there is a potential for unknown archaeological resources to occur within IPM Program Area preserves, any of which could be eligible for the CRHR and thus considered unique archaeological resources. Ground-disturbing manual and mechanical activities proposed under the IPM Program could result in discovery or damage of unique archaeological resources if present, as defined in State CEQA Guidelines Section 15064.5. This would be a **potentially significant** impact.

As shown in Table 3.6-1, there are multiple previously recorded archaeological resources within the IPM Program Area. Because of the incidence of known resources and the history of Native American activities in the vicinity of the IPM Program Area, it is possible that previously undiscovered archaeological resources may also be present in the IPM Program Area. The North Coyote Valley Open Space Preserve, which was acquired after the records search was conducted, may include archeological resources based on the presence of resources in the surrounding region. Any of these resources could be eligible for listing in the CRHR and therefore considered unique archaeological resources for the purposes of CEQA.

Ground disturbing manual and mechanical IPM treatment activities, such as hoeing, digging, cultivating, ~~and~~ discing, and rodent burrow removal could uncover archaeological resources if present within treatment areas. While this would be unlikely in agricultural areas because of previous soil and ground disturbance, it is possible in previously undisturbed areas. Therefore, this would be a **potentially significant** impact.

Mitigation Measure 3.6-2a: Records Search and Survey Before Ground Disturbance for Archaeological Resources

An archaeological and historical resource record search will be conducted prior to implementing ground disturbing IPM treatments on added preserves for which a records search is not available. Once the exact locations of ground disturbing IPM treatment activities have been determined and before commencement, the cultural records shall be consulted and a qualified archaeologist shall conduct pedestrian surveys in areas where previously recorded archaeological resources have been identified. In the event of a surface find, materials will be evaluated and recorded on standard Department of Parks and Recreation primary record forms (DPR 523) in accordance with national and state criteria. A determination of eligibility/ineligibility for the CRHR will be recommended for any surface finds. A survey report shall be completed by the qualified archaeologist and will include recommendations for minimizing potential adverse effects to any archaeological resource finds. The Authority shall follow recommendations identified in the report, which may include activities such as subsurface testing, implementing a Worker Environmental Awareness Program, flagging and complete avoidance of sites, construction monitoring by a qualified archaeologist, or notification of the geographically and culturally affiliated Native American tribe to extend an invitation for construction monitoring. If no archaeological resources are found during the pedestrian survey, the proposed IPM activities may proceed.

Mitigation Measure 3.6-2b: Halt Ground Disturbance Upon Discovery of Subsurface Archaeological Features

In the event that any surface or subsurface archaeological features or deposits, including locally darkened soil ("midden") that could conceal cultural deposits are discovered, all ground-disturbing activity within 100 feet of the find shall be halted and a qualified professional archaeologist shall be retained to assess the significance of the find. If the archaeologist determines that the find does not meet the CRHR standards of significance for cultural resources, IPM activities may proceed. If the qualified archaeologist determines the archaeological material to be Native American in nature, the Authority shall contact the appropriate Native American tribe for their input on the preferred treatment of the find. If the archaeologist determines that further information is needed to evaluate significance, a data recovery plan shall be prepared. If the find is determined to be significant by the archaeologist (i.e., because it is determined to constitute a unique archaeological resource), the archaeologist shall develop, and the Authority shall implement, appropriate procedures to protect the integrity of the resource and ensure that no additional resources are affected. Procedures could include but would not necessarily be limited to preservation in place (which shall be the preferred manner of mitigating impacts to archaeological sites), archival research, subsurface testing, or contiguous block unit excavation and data recovery (when it is the only feasible mitigation, and pursuant to a data recovery plan).

<u>Significance after Mitigation</u>

Implementation of Mitigation Measure 3.6-2a and 3.6-2b would avoid impacts to archaeological resources by requiring archaeological records searches for added preserves, surveys for previously recorded archaeological resources before ground disturbing activities, and following recommendations of a qualified professional archeologist if unique archaeological resources are found, and halting ground disturbance in the event of a surface or subsurface find and implementing professionally-accepted and legally-compliant procedures regarding the treatment of archaeological resources. Therefore, the impact would be **less than significant after mitigation**.

Impact 3.6-3: Potential to Disturb Human Remains

The records search conducted for the IPM Program noted the presence of a burial site within the IPM Program Area and ground-disturbing IPM treatment activities could uncover previously unknown human remains. If human remains are discovered during IPM treatments, the Authority would comply with California Health and Safety Code Sections 7050.5 and 7052 and California Public Resources Code Section 5097 regarding the treatment of human remains. Therefore, the impact would be **less than significant**.

As shown in Table 3.6-1, the records search conducted for the IPM Program noted the presence of a burial site within the IPM Program Area. Because the location of grave sites and Native American remains can occur outside of identified cemeteries or burial sites, and the North Coyote Valley Open Space Preserve was not included in the records search, additional burial sites could be present within the IPM Program Area and could be uncovered by ground disturbing IPM activities.

California law recognizes the need to protect Native American human burials, skeletal remains, and items associated with Native American burials from vandalism and inadvertent destruction. The procedures for the treatment of Native American human remains are contained in California Health and Safety Code Sections 7050.5 and 7052 and California Public Resources Code Section 5097. Additionally, the Santa Clara County Ordinance Code includes Sections B6-18 through B6-20, which describe the protocol should any human remains be uncovered during IPM Program activities. These statutes require that, if human remains are discovered, potentially damaging ground-disturbing activities in the area of the remains shall be halted immediately, and the appropriate County coroner shall be notified immediately. If the remains are determined by the coroner to be Native American, the NAHC shall be notified within 24 hours and the guidelines of the NAHC shall be adhered to in the treatment and disposition of the remains. Following the coroner's findings, the NAHC-designated MLD shall determine the ultimate treatment and disposition of the remains and take appropriate steps to ensure that additional human interments, if present, are not disturbed. The responsibilities for acting upon notification of a discovery of Native American human remains are identified in PRC Section 5097.94. In addition, Impact 3.6-2 above addresses potential impacts to archaeological resources through requiring surveys in areas where previously recorded archaeological resources are present before ground disturbing IPM activities and following recommendations of a qualified archaeologist in the event of a find, which would include previously recorded burial sites. Thus, the previously recorded burial site area would be surveyed before ground disturbing IPM activities to determine if human remains or other associated artifacts are present. If any human remains are found at the previously recorded burial site, or are uncovered during IPM Program implementation, the Authority would comply with California Health and Safety Code Sections 7050.5 and 7052 and California Public Resources Code Section 5097.

Because the Authority would comply with California Health and Safety Code Sections 7050.5 and 7052 and California Public Resources Code Section 5097, which require the implementation of procedures to avoid and minimize the disturbance of human remains and the appropriate treatment of any remains that are discovered, this impact would be **less than significant**.

Impact 3.6-4: Potential to Cause a Substantial Adverse Change in the Significance of a Tribal Cultural Resource

Although no Native American tribes requested consultation pursuant to AB 52, the SLF search conducted by the NAHC for the IPM Program returned positive results and Native American tribes have previously inhabited portions of the IPM Program Area; therefore, there is a potential for tribal cultural resources to be present in the IPM Program Area. Ground-disturbing manual and mechanical activities proposed under the IPM Program could result in the inadvertent discovery or damage of unknown tribal cultural resources, if present. This would be a **potentially significant** impact.

The Authority requested a records search of the NAHC's SLF and a list of Native American tribes traditionally affiliated with the IPM Program Area. The NAHC provided a positive response to the SLF request within the IPM Program Area and provided a list and contact information for seven Native American tribes who may have knowledge of cultural resources within the IPM Program Area and may have interest in the IPM Program. The Authority sent notifications pursuant to AB 52 regarding the proposed IPM Program via certified mail to the seven Native American tribal contacts provided by the NAHC. Letters were sent to the following tribes: Amah Mutsun Tribal Band, Amah Mutsun Tribal Band of Mission San Juan Bautista, Indian Canyon Mutsun Band of Costanoan, Muwekma Ohlone Indian Tribe of the San Francisco Bay Area, North Valley Yokuts Tribe, and the Ohlone Indian Tribe. No responses were received from any of the tribes and AB 52 compliance is complete. Although no responses were received from any Native American tribes pursuant to AB 52, because the NAHC's SLF search results were positive and the IPM Program Area is known to have included Native American use, there is a potential for tribal cultural resources to be present (e.g., Native American remains, archaeological artifacts). If tribal cultural resources are present in the IPM Program Area, they could be uncovered by ground disturbing IPM activities.

As described under Impact 3.6-3, the Authority would comply with California Health and Safety Code Sections 7050.5 and 7052 and California Public Resources Code Section 5097, which require the implementation of procedures to avoid and minimize the disturbance of human remains and the appropriate treatment of any remains determined to be Native American that are discovered, including notifying the NAHC within 24 hours and adhering to the NAHC's guidelines regarding the treatment and disposition of the remains. If the coroner's finding the humans remains to be Native American, the NAHC-designated MLD shall determine the ultimate treatment and disposition of the remains and take appropriate steps to ensure that additional human interments, if present, are not disturbed. The responsibilities for acting upon notification of a discovery of Native American human remains are identified in PRC Section 5097.94.

Ground disturbing manual and mechanical IPM treatment activities, such as hoeing, digging, cultivating, ~~and~~ discing, <u>and rodent burrow removal</u> could uncover archaeological resources if present within treatment areas, which may be considered tribal cultural resources. While this would be unlikely in agricultural areas because of previous soil and ground disturbance, it is possible in previously undisturbed areas. Therefore, this would be a **potentially significant** impact.

Mitigation Measures

Mitigation Measure 3.6-2a: Records Search and Survey Before Ground Disturbance for Archaeological Resources

Mitigation Measure 3.6-2b: Halt Ground Disturbance Upon Discovery of Subsurface Archaeological Features

Significance after Mitigation

Implementation of Mitigation Measures 3.6-2a and 3.6-2b would avoid impacts to tribal cultural resources by requiring recent records searches and archaeological resource surveys prior to ground disturbance and halting all ground-disturbing activity within 100 feet of any discovered surface or subsurface archaeological features or deposits, including locally darkened soil ("midden") that could conceal cultural deposits. A qualified professional archaeologist would be retained to assess the significance of the find. If the qualified archaeologist determines the archaeological material to be Native American in nature, the Authority would contact the appropriate Native American tribe for their input on the preferred treatment of the find. The Authority would adhere to all professionally-accepted and legally-compliant procedures regarding the treatment of any archaeological finds, including those that are potentially tribal cultural resources. Therefore, the impact would be **less than significant after mitigation**.

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3.7 RECREATION

This section summarizes the regulatory environment as it relates to recreational resources, describes existing recreational facilities in the vicinity of the IPM Program Area, and evaluates the effects of the implementation of the proposed IPM Program on existing recreational facilities in the vicinity of the IPM Program Area.

There were no comments received on the Notice of Preparation related to recreation.

3.7.1 Regulatory Setting

FEDERAL AND STATE

No federal or state regulations pertaining to recreation are applicable to the proposed IPM Program.

LOCAL

Santa Clara Valley Open Space Authority IPM Policy

The Authority has developed IPM policies with input from the Citizen's Advisory Committee and partner agencies and organization which informs the IPM Manual. The following policy is applicable to recreation as it relates to the IPM Program:

- IPM Policy 1 Item 2: Develop pest management strategies and priorities to manage pests and potential human interactions in recreational facilities to minimize conflict, ensure visitor safety and enjoyment, and protect the surrounding natural resources.

Santa Clara Valley Greenprint

The Authority's Santa Clara Valley Greenprint identifies goals, priorities, and strategies for land conservation to meet the Authority's vision for the valley. The following recreation related goals and strategies are applicable to the IPM Program.

GOAL: Protect and manage a network of open space lands that provide opportunities for nature-based recreation and education for all residents.

Strategy: Maintain Authority preserves and recreational facilities to a high standard to provide visitors with a safe and enjoyable experience and to encourage increased use.

City of Morgan Hill General Plan

The IPM Program Area includes the El Toro preserve which is located within the jurisdiction of the city of Morgan Hill. There are no polices in the City of Morgan Hill General Plan pertaining to recreation that are applicable to the IPM Program (City of Morgan Hill 2017).

City of San Jose General Plan

The IPM Program Area includes Coyote Ridge, Coyote Valley, Rancho Canada del Oro, Santa Teresa Foothills, and Sierra Vista preserves which are located within the city of San Jose. The Envision San Jose 2040 General Plan (City of San Jose 2018) identifies the following recreation related policy relevant to the IPM Program.

- PR-6.5: Design and maintain park and recreation facilities to minimize water, energy and chemical (e.g., pesticides and fertilizer) use. Incorporate native and/or drought-resistant vegetation and ground cover where appropriate.

3.7.2 Environmental Setting

REGIONAL RECREATIONAL LANDS AND FACILITIES

Regional recreational lands and facilities are provided to Santa Clara County by several federal, state, and local agencies, including the U.S. Fish and Wildlife Service (USFWS), California Department of Parks and Recreation (CDPR), Santa Clara County Regional Park System, Midpeninsula Regional Open Space District, as well as by the Authority. Regional recreation facilities typically cover large areas and accommodate activities such as hiking, bicycling, running, wildlife viewing, and camping. In addition to the regional facilities provided by the above agencies, cities within the county provide local neighborhood park and recreational facilities. City park facilities differ from regional park facilities and preserves because they are typically smaller and offer different types of recreation amenities, such as playgrounds, sports fields, and picnic areas. Because recreation amenities at city parks differ greatly from those offered at large parks and preserves, recreational users displaced from regional amenities, such as IPM Program Area preserves, would not be expected to use city parks in place of regional facilities; therefore, city parks in the vicinity of the IPM Program are not discussed. Each of the regional recreational providers and their associated facilities are described in more detail below and shown in Figure 3.7-1.

U.S. Fish and Wildlife Service

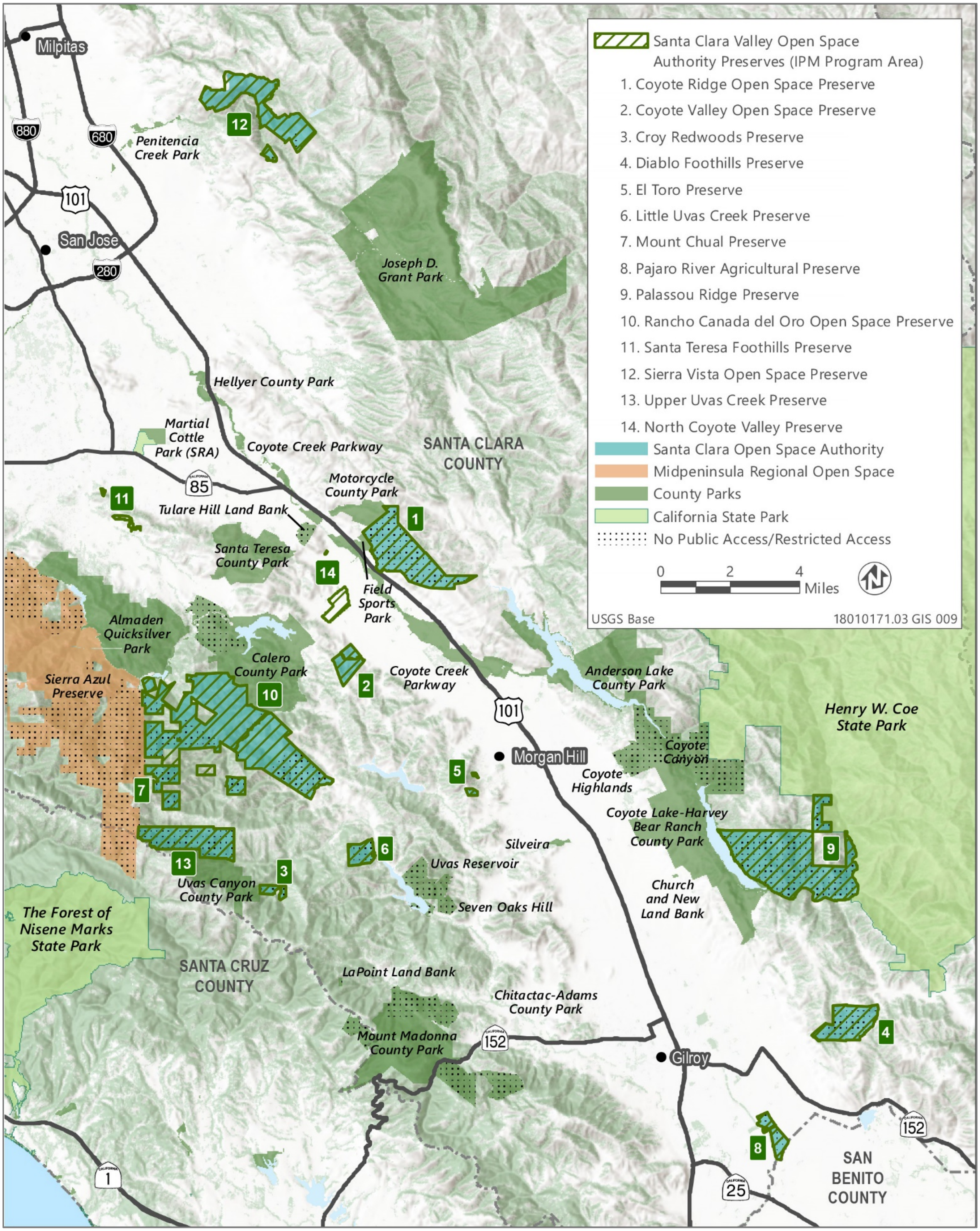
USFWS manages the San Francisco Bay National Wildlife Refuge, which consists of approximately 18,000 acres of wetlands, salt ponds, and mudflats along the perimeter of San Francisco Bay. Approximately 3,700 acres of the refuge are located within Santa Clara County and provide wildlife-oriented recreation to the region’s residents (Santa Clara County 1994a, Santa Clara County 1994b). The wildlife refuge provides a variety of recreational uses including boating, fishing and hunting, hiking trails, wildlife viewing and photography. Several public access points are provided throughout the wildlife refuge. The Environmental Education Center located at 1751 Grand Boulevard in Alviso is approximately 11 miles north of downtown San Jose, or 8 miles northwest of the Authority’s Sierra Vista Open Space Preserve, and provides access to trails, picnic areas and observational viewpoints (USFWS 2013).

California Department of Parks and Recreation

CDPR owns and maintains Henry W. Coe State Park, which is the largest state park in northern California with over 87,000 acres of wild open spaces, located in the Diablo Range east of Morgan Hill. The park is located directly east of the Authority’s Palassou Ridge Preserve. The park is open year-round to the public and attracts hikers, mountain bikers, backpackers, equestrians, campers, picnickers, and photographers (CDPR 2019a). In addition, CDPR owns The Forest of Nisene Marks State Park located in Santa Cruz County in the Santa Cruz Mountains, approximately 2 miles south of the Authority’s Upper Uvas Creek Preserve. The Forest of Nisene Marks State Park provides 30 miles of hiking and biking trails, as well as picnic areas and horseback riding (CDPR 2019b).

Santa Clara County Regional Park System

The Santa Clara County Parks and Recreation Department maintains 28 regional parks encompassing over 52,000 acres of land. Regional parks are generally more than 200 acres in size and provide opportunities for recreation to county residents (Santa Clara County 2018a). Regional parks include the Coyote Lake Harvey Bear Ranch, a 6,695-acre regional park, located near Henry W. Coe State Park, featuring a lake for fishing and boating; Joseph D. Grant County Park, a 10,882-acre park in the east foothills of the Santa Clara Valley, which features hiking, mountain biking, and equestrian trails, as well as picnic and camping areas; and Almaden Quicksilver County Park, a 4,163-acre park located in the Capitancillos Ridge, which provides over 37 miles of trails for hikers, equestrians, and bikers (Santa Clara County 2019). Several of these regional parks are located directly adjacent to or in the vicinity of the Authority’s preserves, including Almaden Quicksilver County Park, Calero County Park, Uvas Canyon County Park, and Joseph D. Grant County Park.



Source: Data downloaded from Midpeninsula Regional District, CA State Parks, and SCVOSA in 2019 and CPAD in 2020

Figure 3.7-1 Regional Public Recreation

Midpeninsula Regional Open Space District

Midpeninsula Regional Open Space District has preserved nearly 65,000 acres of public land and manages 26 open space preserves in Santa Clara County. The District's preserves range from 55 to over 18,000 acres and include redwood, oak, and fir forests, chaparral-covered hillsides, riparian corridors, grasslands, and wetlands in the southwestern portion of the San Francisco Bay Area. The District provides public access, free of charge, 365 days a year, to 25 preserves where visitors find over 240 miles of trails (Midpeninsula Regional Open Space District 2019). As shown in Figure 3.7-1, the Sierra Azul preserve is adjacent to IPM Program Area preserves.

Santa Clara Valley Open Space Authority

As described in Chapter 2, "Program Description," the Authority protects over 25,000 acres of open space, natural areas, watersheds, and wildlife habitat and provides ecologically friendly outdoor recreation opportunities in Santa Clara County. Three preserves: Sierra Vista Open Space Preserve, Rancho Canada del Oro Open Space Preserve, and Coyote Valley Open Space Preserve, are open to the public, free of charge, 365 days a year and provide trails and picnic areas for recreation. These three preserves are included in the IPM Program Area (refer to Figure 3.7-1). Additional preserves in the IPM Program Area may be open to public access in the future.

RECREATIONAL USE AND NEEDS

According to the Santa Clara County Parks 2018 Strategic Plan, approximately 90 percent of the county's residents live within five miles of a county park and the county's regional park system is estimated to serve more than 3 million visitors annually (Santa Clara County 2018b:16). In addition, the County Parks Department served nearly 150,000 visitors through recreational programs and special events in 2016 (Santa Clara County 2018b:18). Primary uses include trail use (i.e., walking, hiking, and running), picnicking, camping, and bicycling. Consistent with state and national trends, Santa Clara County parks have also experienced steady demand for specialized recreation opportunities including off-leash dog parks, disc golf, kayaking, etc. (Santa Clara County 2018b:24).

3.7.3 Environmental Impacts and Mitigation Measures

METHODOLOGY

The evaluation of potential impacts to recreation from implementation of the IPM Program is based on a review of documents and data identifying existing recreation facilities and use in the region, including the Santa Clara County General Plan, Santa Clara County Parks 2018 Strategic Plan, and Countywide Trails Prioritization and Gaps Analysis, as well as aerial review of the IPM Program Area and its surroundings. The potential impacts to recreation that would result from IPM Program implementation are assessed by reviewing existing IPM Program Area preserve use and evaluating the potential for the IPM Program to create significant demand for and use of other recreational resources in the area.

THRESHOLDS OF SIGNIFICANCE

Based on Appendix G of the CEQA Guidelines, the IPM Program would result in a significant impact to recreation resources if it would:

- increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated, or
- include recreational facilities or require the construction or expansion of recreational facilities that might have an adverse physical effect on the environment.

ISSUES NOT DISCUSSED FURTHER

The IPM Program would manage existing recreational lands and facilities owned by the Authority and would not require the construction or expansion of any recreational facilities. Therefore, the IPM Program would not result in construction of facilities that might have an adverse physical effect on the environment and this issue is not discussed further.

ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

Impact 3.7-1: Potential to Increase the Use of Existing Parks or Other Recreation Facilities Resulting in Physical Deterioration of the Facility

The IPM Program proposes to implement various pest control treatment activities on recreational facilities within the IPM Program Area. Mechanical and chemical treatment activities could result in temporary disruptions to recreational uses and access when conducted in public preserves within the IPM Program Area due to closures from heavy equipment use or use of herbicides. Recreational users of IPM Program Area preserves may elect to visit alternative regional recreational facilities during closures; however, disruptions to recreational uses would be temporary, lasting between one day and one week, and would typically be confined to one small area of a larger preserve. Therefore, when occurring in an IPM Program Area preserve that is open to the public, other areas of the preserve would likely remain open to recreation. Furthermore, only three of the 14 preserves in the IPM Program Area are open to the public. Because the IPM Program would be implemented across the preserves, the rate at which activities requiring public closures would be minimal. Furthermore, in the long-term, pest control treatment activities would likely benefit public recreation by reducing the presence of nuisance pests, such as poison oak and wasps. The IPM Program would not result in a substantial increase in the use of existing parks or recreation facilities and would not result in the physical deterioration of recreational facilities. Therefore, this impact would be **less than significant**.

The IPM Program proposes the use of manual, mechanical, and chemical pest control treatments within the IPM Program Area. As described in Section 2.7.1, “IPM Treatment Types,” manual treatments include relatively low impact activities that would be implemented by hand, such as prevention and sanitation (e.g., picking up trash), digging and pulling weeds, habitat modifications (e.g., pond draining to remove American bullfrogs), and trapping animal pests. These activities would have little to no effect on existing recreation uses within the IPM Program Area because they would not be expected to disrupt recreation activities and would not likely require closures of public areas. Other IPM treatment activities proposed under the IPM Program would require the use of equipment such as chainsaws, pole saws, and tractor-operated mowers, as well as require the use of herbicides, within recreational facilities and vegetative rights-of-way. These areas include public trails, roads, parking lots, picnic areas, and structures used to store equipment and materials for IPM activities. While these treatments are being implemented within and near public areas, temporary closures may be required, which could result in the increased use of recreational facilities in the area. However, as described in Chapter 2, “Program Description,” the Authority currently implements manual, mechanical, and chemical treatments for vegetation and animal pest management within recreational facilities and vegetative rights-of-way across Authority preserves. Implementation of the IPM Program would be reasonably expected to increase the number of simultaneous treatment activities by a few additional treatments over current levels within the IPM Program Area. This slight increase is minor and would be spread across the 14 preserves in the IPM Program Area; only three of which are currently open to the public. Therefore, the increase in closures of public recreational facilities as a result of the IPM Program would be minor. Furthermore, closures would be short-term and temporary, lasting one day to one week, and only occur in the area of a preserve where the treatment is occurring; other unaffected areas of a preserve would remain open. Therefore, implementation of the IPM Program would not be expected to substantially disrupt visitor access or use in such a way that significant use and associated deterioration of other recreational facilities would result.

As described in Chapter 2, “Program Description,” the IPM Program would manage pests and potential human interactions in recreational facilities to minimize conflict, ensure visitor safety and enjoyment, and protect surrounding natural resources, as required by IPM Policy 1 and described in the IPM Manual (Appendix B). The IPM Program would provide pest management on the Authority's recreation facilities and open space preserves within the IPM Program Area, which is anticipated to have long-term beneficial impacts to natural resources, which would also benefit the public. Therefore, the IPM Program would not increase the use of regional recreation facilities resulting in substantial physical deterioration and the impact is **less than significant**.

3.8 WILDFIRE

This section evaluates the effects of the proposed IPM Program on wildfire risk. The following analysis considers drivers of wildfire risk, and the whether the proposed IPM Program could potentially add to such risks, and if so, also expose people or structures to wildfire risk. This section also provides background and context on wildfire concepts, such as wildfire regime and wildfire behavior, and summarizes wildfire risks across the IPM Program Area.

There were no comments received on the Notice of Preparation related to wildfire.

3.8.1 Regulatory Setting

FEDERAL

No federal plans, policies, regulations, or laws related to wildfire are applicable to the proposed IPM Program.

STATE

California Department of Forestry and Fire Protection

The California Department of Forestry and Fire Protection (CAL FIRE) is dedicated to the fire protection and stewardship of over 31 million acres of the State Responsibility Area (SRA). CAL FIRE also provides emergency services in 36 of the state's 58 counties via contracts with local governments. Public Resource Code (PRC) Section 4291 gives CAL FIRE the authority to enforce 100 feet of defensible space around all buildings and structures on non-federal SRA lands, or non-federal forest-covered lands, brush-covered lands, grass-covered lands, or any land that is covered with flammable material. PRC Sections 4790 through 4799.04 provide the regulatory authority for CAL FIRE to administer the California Forest Improvement Program. PRC 4113 and 4125 give CAL FIRE the responsibility for preventing and extinguishing wildland fires in the SRA (PRC Sections 4113 and 4125). The PRC, beginning with Section 4427, includes fire safety statutes that restrict the use of equipment that may produce a spark, flame, or fire; require the use of spark arrestors on construction equipment with internal combustion engines; specify requirements for the safe use of gasoline-powered tools in fire hazard areas; and specify fire suppression equipment that must be provided on site for various types of work in fire-prone areas. These requirements could apply to certain IPM Program activities that would occur within the SRA.

Board of Forestry and Fire Protection

The Board of Forestry and Fire Protection (Board) is a Governor-appointed body within CAL FIRE. It is responsible for developing the general forest policy of the state, determining the guidance policies of CAL FIRE, and representing the state's interest in federal forestland in California. Together, the Board and CAL FIRE work to carry out the California Legislature's mandate to protect and enhance the state's unique forest and wildland resources.

The Board is charged with developing policy to protect all wildland forest resources in California that are not under federal jurisdiction. These resources include major commercial and non-commercial stands of timber, areas reserved for parks and recreation, woodlands, brush-range watersheds, and all private and state lands that contribute to California's forest resource wealth. This may include portions of Authority preserves in the IPM Program Area.

LOCAL

Santa Clara Valley Open Space Authority

The Authority is taking preventative steps to reduce the risk of wildfires and plans to develop a fuel management plan and policy. This plan will be a part of the Authority's vegetation management program and will incorporate resource management goals to enhance native plant diversity and reduce invasive plants. The Authority has developed IPM policies as described in Chapter 2 of the IPM Manual (Appendix B); however, there are no policies related to wildfire. Therefore, there are no Authority plans or policies related to wildfire that are applicable to the proposed IPM Program.

Santa Clara County General Plan

There are no policies related to wildfire that are applicable to the IPM Program in the Santa Clara County General Plan (Santa Clara County 1994).

City of Morgan Hill General Plan

The Morgan Hill 2035 General Plan contains goals and policies related to minimizing threats and damage from fire hazards, including wildfire, in the Safety, Services, and Infrastructure element of the General Plan (City of Morgan Hill 2017). However, none of these goals and policies are applicable to the pest management activities proposed in the IPM Program.

City of San Jose General Plan

The Envision San Jose 2040 General Plan contains the following policies related to wildfire that are relevant to the IPM Program (City of San Jose 2018):

- Policy MS-10.8: Minimize vegetation removal required for fire prevention. Require alternatives to discing, such as mowing, to the extent feasible. Where vegetation removal is required for property maintenance purposes, encourage alternatives that limit the exposure of bare soil.
- Policy EC-8.4: Require use of defensible space vegetation management best practices to protect structures at and near the urban/wildland interface.

3.8.2 Environmental Setting

WILDFIRE REGIME

Wildfire regime describes the spatial and temporal patterns and ecosystem impacts of fire on the landscape. It is characterized by fire frequency, intensity, severity, and area burned. “Fire frequency” refers to the number of fires that occur in a given area over a given period of time; “fire intensity” refers to the speed at which fire travels and the heat that it produces; “fire severity” involves the extent to which ecosystems and existing conditions are affected or changed by a fire; and “area burned” is the size of the area burned by wildfire.

WILDFIRE BEHAVIOR AND CONTROLLING FACTORS

Wildfire behavior is a product of several variables that intermix to produce local and regional fire regimes that affect how, when, and where fires burn. Chief among these are climate, vegetation, topography, and human influence. It is important to understand how the variables that affect fire behavior produce fire risks.

Some of the variables that control wildfire behavior, namely, climate, vegetation, and human influence (discussed below), are rapidly changing in California and elsewhere—changes that are producing a fire regime that is increasingly susceptible to fire danger and gradually becoming more hazardous throughout the state. Warming, frequent droughts, and the legacy of past management policies, combined with the increase in development and expansion of the wildland-urban interface (WUI), have increased the risk of catastrophic damage during wildfires, which poses a substantial threat and cost to society. Recent trends have shown an increase in the number of ignitions, area burned, and impacts on ecosystems since 2007. Annually, since 2000, the average annual acres burned in California has more than doubled the annual average during the 1960s (Board and CAL FIRE 2018). This trend is expected to continue, and wildfire frequency and severity in California are anticipated to increase over the next century.

Human Influence on Wildfire

Human influence on wildfire is broad and can be substantial. It includes direct influences such as the ignition and suppression of fires, and indirect influence through climate change and alterations in land use patterns that support modified vegetative regimes and increased development in the WUI (refer to "Climate Change and Wildfire" below for more discussion on the indirect effect of climate change on wildfire).

Humans are responsible for most wildfire ignitions; however, natural events may also cause ignition (e.g., dry lightning). Once a wildfire has started, its spread and behavior become a function of fuel characteristics, terrain, and weather conditions (Syphard et al. 2008). Human-induced wildfire ignitions can change fire characteristics in two ways: (1) changing the distribution and density of ignitions, and (2) changing the seasonality of burning activity (Balch et al. 2017). A study of wildfires across the U.S. for the 20-year period between 1992 and 2012 showed that 82 percent of wildfires during that period were started by human causes (Balch et al. 2017), while in California specifically, humans account for starting approximately 95 percent of wildfires (Syphard et al. 2007). In California in 2017, more than half of all fires were caused by humans; including miscellaneous and undetermined causes, that number increases to 94 percent (CAL FIRE 2019).

Human ignitions include a multitude of sources, such as escapes from debris and brush-clearing fires, electrical equipment malfunctions, campfire escapes, smoking, fire play (e.g., fireworks), vehicles, and arson. Consequently, areas near human development, especially in the WUI or in areas near campgrounds, roads, or infrastructure, generate fires at a more frequent rate than very remote or urban areas (Syphard et al. 2007, Mann et al. 2016, Balch et al. 2017).

Climate Change and Wildfire

Wildfires are a significant threat in California, particularly in recent years as the landscape responds to climate change and decades of fire suppression. It is estimated that since 1985, more than 50 percent of the increase in the area burned by wildfire in the western U.S. is attributable to anthropogenic climate change (Abatzoglou and Williams 2016). As climate change persists, it will produce increasing temperatures and drier conditions that will generate abundant dry fuels. All wildfires (those initiated by both natural and human-made sources) tend to be larger under drier atmospheric conditions and when fed by drier fuel sources (Balch et al. 2017).

Additionally, climate change has led to exacerbation of wildfire conditions during a longer period of the year as the spring season has warmed—driving an earlier spring snowmelt, and as winter precipitation has overall decreased (Westerling et al. 2006). Further, wildfire activity is closely related to temperature and drought conditions, and in recent decades, increasing drought frequency and warming temperatures have led to an increase in wildfire activity (Westerling et al 2006, Schoennagel et al. 2017). In particular, the western U.S., including California, has seen increases in wildfire activity in terms of area burned, number of large fires, and fire season length (Westerling et al. 2006, Abatzoglou and Williams 2016). These conditions have resulted in the largest, most destructive, and deadliest wildfires on record in California history, several of which occurred in the last five years. The 2018 Camp Fire is ranked as the deadliest and most destructive California wildfire and resulted in 85 known deaths and the loss of 18,804 structures (although the Camp Fire was the deadliest and most destructive fire in recorded history, it is not reflected in Table 3.8-1 because it is not one of the top ten in terms of size) (CAL FIRE 2020a; 2020b). The 2020 fire season resulted in five of the 10 largest fires in California history, including the August Complex Fire which burned 1,032,649 acres (Table 3.8-1). Prior to the 2020 fire season, the largest fire was the Mendocino Complex, which was half the size of the August Complex Fire and burned 459,123 acres (CAL FIRE 2020c).

In addition to the deadliness and destructiveness of the largest fires, the total number and total acreage of wildfires are also important. Highly destructive fires attract the most attention in press coverage and public awareness; however, from the perspective of wildfire risk reduction, it is also critical to understand and address the more frequent and more widespread smaller fires. Total burned acreage in California can be highly variable, from fewer than 150,000 acres in 2010 to an estimated 4.2 million acres in 2020 (CAL FIRE 2018a, 2018b, 2020c). Four in the last 12 years have exceed 1.0 million acres (2008, 2017, 2018, and 2020) (CAL FIRE 2018a, 2018b, 2018c). In 2020, there were over 9,917 wildfires in the state during the calendar year (CAL FIRE 2020c).

Table 3.8-1 Ten Largest California Wildfires

#	Fire Name (cause)	Acres	Date	County
1	August Complex (under investigation)	1,032,649	August 2020	Mendocino, Humboldt, Trinity, Tehama, Glenn, Lake, Colusa
2	Mendocino Complex (under investigation)	459,123	July 2018	Colusa, Lake, Mendocino, Glenn
3	SCU Lightning Complex (under investigation)	396,624	August 2020	Stanislaus, Santa Clara, Alameda, Contra Costa, San Joaquin
4	Creek Fire (under investigation)	377,693	September 2020	Fresno, Madera
5	LNU Lightning Complex (under investigation)	363,220	August 2020	Sonoma, Lake, Napa, Yolo, Solano
6	North Complex (under investigation)	318,930	August 2020	Butte, Plumas, Yuba
7	Thomas (powerlines)	281,893	December 2017	Ventura, Santa Barbara
8	Cedar (human related)	273,246	October 2003	San Diego
9	Rush (lightning)	271,911 CA 43,666 NV	August 2012	Lassen
10	Rim (human related)	257,314	August 2013	Tuolumne

Note: CA = California; NV = Nevada

Source: CAL FIRE 2020c

Climate change will continue to produce conditions that facilitate a longer fire season, which, when coupled with human-caused changes in the seasonality of ignition sources, will produce more, longer, and bigger fires during more times of the year. According to California's *Fourth Climate Change Assessment*, *Statewide Summary Report* (OPR et al. 2018), if greenhouse gas emissions continue to rise, the frequency of extreme wildfires burning over 25,000 acres could increase by 50 percent by 2100 and the average area burned statewide could increase by 77 percent by the end of the century (OPR et al. 2018).

WILDFIRE ENVIRONMENT WITHIN SANTA CLARA COUNTY

Wildfire Risk

Some areas of Santa Clara County are considered "high or extreme fire hazard areas" due to a combination of factors including climatic factors, such as rainfall, humidity, and wind patterns; the amount of naturally-occurring "fuel" for fires, such as brush, dead trees, and grasses that ignite easily and burn hotly; steepness of slopes; and inaccessibility and lack of available water supplies for fire suppression (Santa Clara County 1994). CAL FIRE wildfire statistics for 2020 show that there was a total of six wildfires in the County, five of which were larger than 100 acres (CAL FIRE 2021). The 5,513-acre Crews Fire was the largest of the six wildfires in the County and burned through the Diablo Foothills Preserve in July 2020 (Midpen 2020). The large SCU Lightning Complex fire also crossed into part of northern Santa Clara County.

CAL FIRE has mapped fire hazard severity zones (FHSZs) for the entire state, including the IPM Program Area. FHSZ delineations are based on an evaluation of fuels, fire history, terrain, housing density, and occurrence of severe fire weather. They are intended to identify areas where urban conflagrations could result in catastrophic losses. FHSZs are categorized as: Moderate, High, and Very High, which are defined as follows (CAL FIRE 2007a):

- Moderate: Wildland areas supporting areas of typically low fire frequency and relatively modest fire behavior or developed/urbanized areas with a very high density of non-burnable surfaces including roadways, irrigated lawn/parks, and low total vegetation cover (greater than 30 percent) that is highly fragmented and low in flammability (e.g., irrigated, manicured, managed vegetation).

- High: Wildland areas that support medium to high hazard fire behavior and roughly average burn probabilities or developed/urban areas typically with moderate vegetation cover and more limited non-burnable cover. Vegetation cover typically ranges from 30 to 50 percent and is only partially fragmented.
- Very High: Wildland areas that support high to extreme fire behavior or developed/urban areas with high vegetation density (greater than 70 percent cover) and associated high fuel continuity.

The IPM Program Area contains Moderate, High, and Very High FHSZs (see Figure 3.8-1 and Table 3.8-2). As shown in Table 3.8-2, about half of the preserves in the IPM Program Area have portions designated as Very High FHSZs, although the overall total is approximately 2,954 acres, or 18 percent of the total 16,446-acre IPM Program Area.

Table 3.8-2 Fire Hazard Severity Zone Designations in the IPM Program Area

Preserve	Acres in Very High FHSZ	Acres in High FHSZ	Acres in Moderate FHSZ
Coyote Ridge Open Space Preserve	1	1,219	612
Coyote Valley Open Space Preserve	--	346	2
Croy Redwoods Preserve	116	--	--
Diablo Foothills Preserve	--	540	294
El Toro Preserve	39	--	--
Little Uvas Creek Preserve	164	112	--
Mount Chual Preserve	224	328	--
Pajaro River Agricultural Preserve[1]	--	--	--
Palassou Ridge Preserve	--	3,378	147
Rancho Canada del Oro Open Space Preserve	1,197	4,338	4
Santa Teresa Foothills Preserve	--	62	--
Sierra Vista Open Space Preserve	--	1,549	41
Upper Uvas Creek Preserve	1,214	2	--
North Coyote Valley Open Space Preserve	--	234	--
TOTALS	**2,954**	**12,107**	**1,100**

Notes: FHSZ = fire hazard severity zone. Acreages are rounded to the nearest whole number.

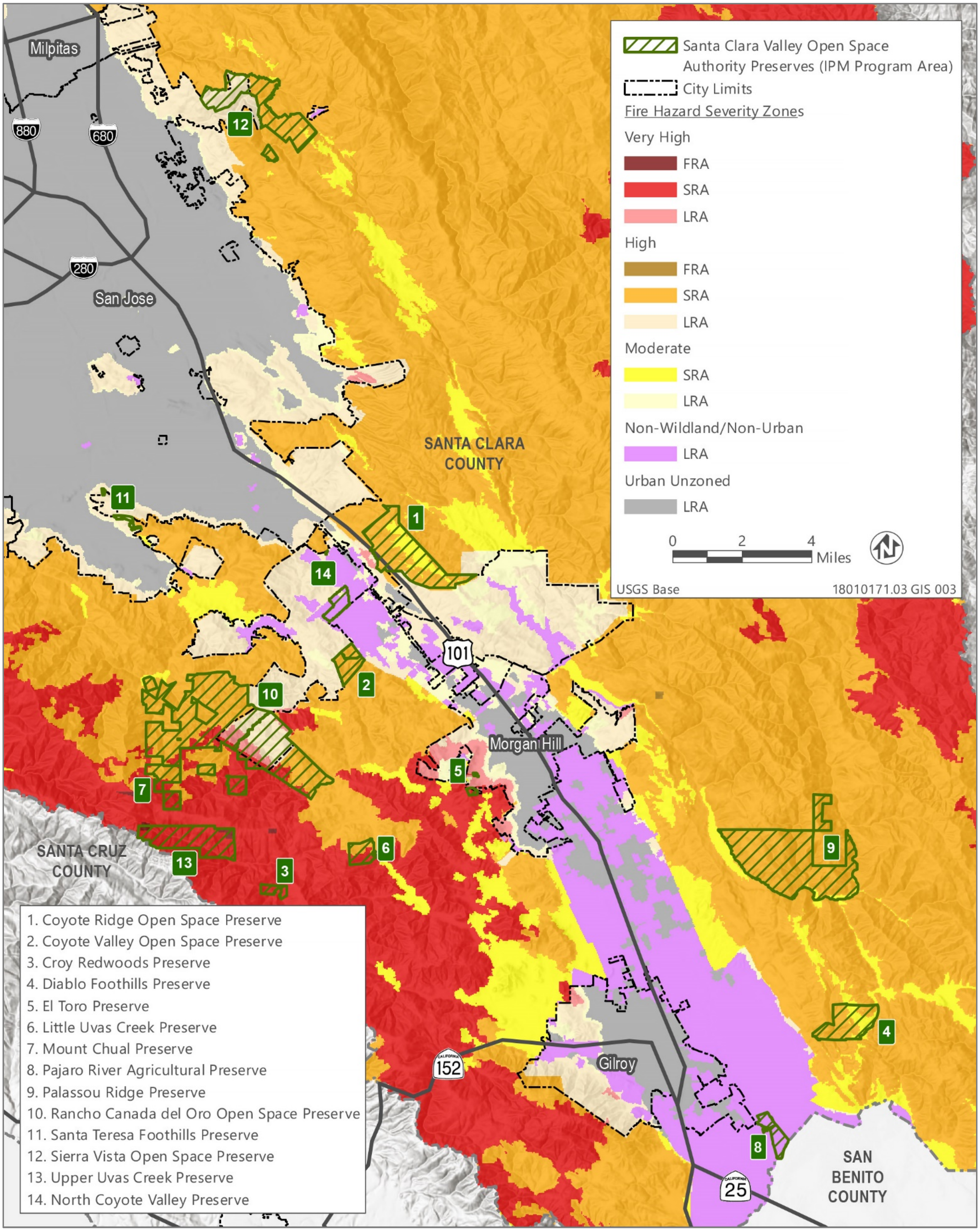
1. Pajaro River Agricultural Preserve is designated as Non-Wildland/Non-Urban.

Source: CAL FIRE 2007b

Fire Protection Services

For purposes of wildland fire protection, California law classifies lands within the state into three categories for jurisdictional and financial responsibility: Federal Responsibility Areas (FRAs), wherein a federal government agency has jurisdiction for wildland fire protection on federally owned land; SRAs wherein CAL FIRE has jurisdiction for wildland fire protection on all lands within this zone whether public or private ownership; and Local Responsibility Area (LRAs), where neither the federal government nor the state have jurisdiction for wildland fire protection. The IPM Program Area includes lands within the FRA, SRA, and LRA. Thus, fire protection services within the IPM Program Area are distributed among the following fire response providers:

- Santa Clara Unit of CALFIRE: The Santa Clara Unit employs multiple programs for fire protection and wildfire risk reduction, including development of pre-fire management tactics, fire prevention, a defensible space inspection program for fire safe clearance around structures, information and education programs, and the Vegetation Management Program to reduce hazardous fuels and achieve natural resource management goals with within the SRA (Santa Clara County 2016).



Source: Data downloaded from CalFIRE in 2007b

Figure 3.8-1 Fire Hazard Severity Zones in the IPM Program Area

- **Santa Clara County Fire Department (SCCFD)**: SCCFD has fire and life safety code responsibilities for the communities of Campbell, Cupertino, Los Altos, Los Altos Hills, Los Gatos, Monte Sereno, Saratoga, and all of unincorporated County area. SCCFD employs over 288 fire prevention, suppression, investigation, administration, and maintenance personnel; daily emergency response consists of 66 employees. SCCFD's suppression force is also augmented by approximately 30 volunteer firefighters. In addition, SCCFD implements a hazardous brush abatement program for hillside areas within its jurisdictional boundaries as part of the overall effort to reduce fire potential (SCCFD n.d.).
- **City of Morgan Hill Fire Department**: The Morgan Hill Fire Department has three fire stations within the city which provide first responder paramedic services, rescue response, fire response, fire prevention services, and other public safety services (City of Morgan Hill n.d.).
- **City of San Jose Fire Department**: The San Jose Fire Department is a high-volume, high-performance, "all-hazard" fire department and has 33 fire stations throughout the city (City of San Jose n.d.).

In addition, the Santa Clara County Fire Safe Council (SCCFSC) works with partners at the federal, state, and local level to provide education and project assistance for homeowners and landowners in communities that are vulnerable to wildfire. SCCFSC works with public agencies, other non-profits, businesses and private landowners to design and implement protective measures, such as developing shaded fuel breaks, to increase wildfire survivability (Santa Clara County 2016).

Post-Fire Debris Flows

Wildfire can significantly alter the hydrologic response of a watershed to the extent that even modest rainstorms can produce dangerous flash floods and debris flow. By reducing or destroying vegetative cover and altering soil characteristics, fires often result in conditions that can significantly increase runoff and erosion when winter rains begin to fall. These conditions may result in a debris flow (also referred to as mud flow), which is a slurry of water, sediment, and rock that converges in a stream channel. The occurrence of erosion, floods, and debris flows in burned areas is also dependent on precipitation intensity—storms with high intensity are more likely to initiate the processes described above and result in flood events. Additionally, easily eroded soils facilitate changes in hill slope conditions and increase the volume of runoff.

The U.S. Geological Survey (USGS) conducts post-fire debris flow hazard assessments for select fires in the Western U.S. The assessment for the Loma Fire, which occurred in Santa Clara County in 2016, shows that the likelihood of debris flow is high in many areas adjacent to and downslope of the burn area, especially in locations that are in ravines and canyons, and at the mouths of canyons (USGS 2016). Portions of Mount Chual Open Space Preserve and Upper Uvas Creek Open Space Preserve are within the burn area of the Loma Fire and may be susceptible to debris flows.

3.8.3 Environmental Impacts and Mitigation Measures

METHODOLOGY

The analysis of environmental impacts on wildfire risk focuses on the potential for new or increased risks associated with wildfire, including impairment of an emergency response plan, exposing people or structures to uncontrolled fire, and post-fire risks such as slope instability or landslides. Significance determinations account for the influence of relevant environmental protection measures (EPMs), which are incorporated into the IPM Program.

THRESHOLDS OF SIGNIFICANCE

Thresholds of significance are based on Appendix G of the State CEQA Guidelines. The IPM Program would result in a significant impact related to wildfire if it would:

- impair an adopted emergency response plan or emergency evacuation plan;

- due to slope, prevailing winds, and other factors, exacerbate wildfire risks, and thereby expose project occupants to pollutant concentrations from a wildfire or the uncontrolled spread of a wildfire;
- require the installation or maintenance of associated infrastructure (such as roads, fuel breaks, emergency water sources, power lines, or other utilities) that may exacerbate fire risk or that may result in temporary or ongoing impacts to the environment; or
- expose people or structures to significant risks, including downslope or downstream flooding or landslides, as a result of runoff, post-fire slope instability, or drainage changes.

ISSUES NOT DISCUSSED FURTHER

As discussed in Section 3.4, "Hazards and Hazardous Materials," implementation of the IPM Program would not alter potential emergency evacuation routes or impair an adopted emergency plan. This issue is not discussed further.

No new infrastructure (such as roads, fuel breaks, emergency water sources, power lines, or other utilities) are proposed under the IPM Program nor would they be required to support the IPM Program. Therefore, the IPM Program would not exacerbate fire risk or create temporary or ongoing impacts to the environment from the installation of infrastructure and this issue is not discussed further.

As discussed in Subsection 3.5.3 in Section 3.5, "Hydrology and Water Quality," no new impervious surfaces are proposed under the IPM Program; therefore, no substantial changes to runoff patterns in the IPM Program Area would occur. In addition, potentially ground disturbing activities such as mowing/cutting or discing and cultivating would not occur within or immediately adjacent to streams or other waterways that may act as drainages. Furthermore, the IPM Program does not include any new housing or other new land uses where the public would congregate and only one to two additional staff may be acquired to implement the IPM Program. Therefore, the potential to expose people to risks of flooding or landslides as a result of drainage changes in the IPM Program Area would not substantially change. This issue is not discussed further.

ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

Impact 3.8-1: Potential to Substantially Exacerbate Fire Risk and Expose People to Wildfire Pollutants or Uncontrolled Spread of a Wildfire

Pest management activities implemented under the IPM Program could result in accidental wildfire ignition risks from the use of vehicles and mechanical equipment in the IPM Program Area, and from the implementation of green flaming to treat vegetation on agricultural lands. However, several EPMs would be implemented to reduce the risk of wildfire ignition from treatment activities by properly maintaining all diesel- and gasoline-powered equipment (EPM HAZ-1), requiring spark arrestors (EPM HAZ-2), and prohibiting smoking in vegetated areas (EPM HAZ-3). Green flaming would be conducted on wet days when fire risk is low, and truck-mounted or backpack water tanks would be on-site during implementation. Furthermore, several fire departments are located in close proximity to the IPM Program Area and would be expected to adequately respond in the event of a wildfire to prevent substantial uncontrolled spread.

Implementation of the IPM Program is expected to increase the number of simultaneous IPM treatment activities by a few additional treatments over current levels within the IPM Program Area, which would not be a substantial increase in treatment activities and their associated wildfire ignition risks. Additionally, the IPM Program does not include any new housing or other new land uses where the public would congregate; there would be no new occupants that could be exposed to pollutant concentrations from a wildfire or the uncontrolled spread of as wildfire as a result of the IPM Program. In the long-term, the IPM Program is expected to reduce wildfire risk by removing invasive and nuisance vegetation. Therefore, with implementation of EPMs; availability of fire protection services in the IPM Program Area; and anticipated fire risk reduction outcomes of the IPM Program; the IPM Program would not substantially exacerbate fire risk and expose people to the uncontrolled spread of wildfire or wildfire related pollutants. This impact would be **less than significant**.

The IPM Program Area contains Moderate, High, and Very High FHSZs (see Figure 3.8-1 and Table 3.8-2) due to climatic factors, flammable vegetation, and areas with steep slopes. Pest management activities implemented under the IPM Program could result in accidental wildfire ignition risks from the use of vehicles and mechanical equipment in the IPM Program Area. These periodic pest management activities would introduce new temporary sources of ignition and fuel to the IPM Program Area in the form of worker vehicles and use of mechanical equipment. In addition, green flaming would be conducted to treat invasive plants on agricultural lands, which would require the use of small, hand-held propane torches.

As summarized in Chapter 2, "Program Description," several EPMs would be implemented to reduce the risk of wildfire ignition from pest management activities. The Authority would maintain all diesel- and gasoline-powered equipment in good working condition, free from leaks, and operating within normal parameters (EPM HAZ-1). All mechanized hand tools would have federal- or state-approved spark arrestors (EPM HAZ-2), which would prevent the emissions of sparks, a potential ignition source. Smoking, if permitted, would only be allowed in designated smoking areas with barren or cleared mineral soil within an area of at least 3 feet in diameter (EPM HAZ-3), which would minimize the risk of accidental wildfire ignition. In addition, pest management strategies for vegetation rights-of-way include grubbing to bare mineral dirt around utility poles and boxes to reduce the risk of fire where utilities are present are in the IPM Program Area. Green flaming would typically be conducted during light rains or on wet days when forest litter or grassland thatch is not likely to catch fire. Additional precautions are taken during implementation, including having truck-mounted or backpack water tanks on-site and conducting green flaming with more than one staff present. Furthermore, as discussed in Section 3.8.2, "Environmental Setting," extensive fire protection services are provided to the IPM Program Area in the event a wildfire occurs, including CAL FIRE, SCCFD, the City of Morgan Hill Fire Department, and the City of San Jose Fire Department. The IPM Program Area is near urban areas where these services are based. Therefore, if a wildfire were to occur, the response would likely be adequate to prevent substantial uncontrolled spread.

Implementation of the IPM Program would be reasonably expected to increase the number of simultaneous treatment activities by a few additional treatments over current levels within the IPM Program Area, which would not be a substantial increase in treatment activities and associated wildfire ignition risks. Additionally, the IPM Program does not include any new housing or other new land uses where the public would congregate; there would be no new occupants that could be exposed to pollutant concentrations from a wildfire or the uncontrolled spread of as wildfire as a result of the IPM Program. As described in Chapter 2, "Program Description," invasive plants, animals, and pathogens can create fire hazards within the IPM Program Area. If not well managed, invasive plants can present a fire risk by creating unnaturally high fuel levels. In addition to achieving other objectives of the IPM Program, invasive plant management techniques are anticipated to reduce fuel levels and associated wildfire risk within the IPM Program Area.

With the implementation of the EPMs, availability of fire protection services in the IPM Program Area, and the fire risk reduction benefits expected with implementation of the IPM Program, the IPM Program would not substantially exacerbate fire risk and expose people to the uncontrolled spread of wildfire or substantial pollutant concentrations. This impact would be **less than significant**.

Impact 3.8-2: Potential to Expose People or Structures to Substantial Risks Related to Post-Fire Landslides or Debris Flow

As discussed in Impact 3.8-1, the IPM Program would not substantially exacerbate fire risk, and thus would not result in a substantial increase in post-fire flooding and landslide due to an increase in wildfire risk itself. Ground disturbing manual and mechanical IPM activities have the potential to destabilize soils, which could increase the risk of post-fire landslides or debris flow if IPM treatments occur on steep slopes. However, manual and mechanical treatment activities would not typically occur on steep slopes and may be replaced with spraying of herbicides when treatment is deemed necessary, which would not result in ground disturbance and associated slope instability. Ground disturbing mechanical activities such as cultivation and discing would be used to prepare soils for crop production on agricultural lands, which are generally flat and not susceptible to landslides or debris flow. In addition, the IPM Program Area includes undeveloped lands where few buildings and structures are located, and it does not include new housing or any other growth-inducing features. Therefore, it would not place additional people or structures in the IPM Program Area. The IPM Program would not expose people or structures to substantial risks from post-fire landslides or flooding and this impact would be **less than significant.**

As described in Section 3.8.2, "Environmental Setting," wildfire can significantly alter the hydrologic response of a watershed by reducing vegetative cover and altering soil characteristics. As a result, subsequent rainstorms after wildfire can produce landslides and debris flows, which can impact people or structures that are located below an area that has burned. Areas of Santa Clara County that have been subject to recent wildfires, including lands within the IPM Program Area, are susceptible to potential debris flows.

As discussed in Impact 3.8-1, the IPM Program would not substantially exacerbate fire risk, and thus would not result in a substantial increase in post-fire flooding and landslide due to an increase in wildfire risk itself. However, manual and mechanical treatments proposed under the IPM Program would result in ground disturbing vegetation removal which could destabilize soils exacerbating post-fire landslide and debris flow hazards. These ground disturbing activities include manual treatments such as pulling and digging, and mechanical treatments such as cultivation and discing. However, as discussed in Chapter 2, "Program Description," manual and mechanical treatment activities would not typically occur on steep slopes for staff safety and may be replaced with spraying of herbicides when treatment is deemed necessary, which would not destabilize soils. Ground disturbing mechanical activities such as cultivation and discing would be used to prepare soils for crop production on agricultural lands, which are generally flat and not susceptible to landslides or debris flow. Therefore, the IPM Program would not destabilize soils on steep slopes such that substantial risks related to post fire landslides or debris flow would be created.

Furthermore, as described in Section 3.1.1, "Effects Found Not to Be Significant," the IPM Program does not include new housing nor would it result in substantial unplanned population growth, and accordingly, would not place additional people or structures in the IPM Program Area. Therefore, the IPM Program would not expose people or structures to substantial risks from post-fire landslides or flooding. This impact would be **less than significant**.

4 CUMULATIVE IMPACT ANALYSIS

4.1 INTRODUCTION TO THE CUMULATIVE ANALYSIS

This chapter presents an analysis of the potential cumulative impacts from implementation of the proposed Integrated Pest Management (IPM) Program. The potential environmental impacts of IPM Program implementation are considered together with other past, present, and probable future projects producing related impacts, as required by Section 15130 of the California Environmental Quality Act Guidelines (State CEQA Guidelines). The goal of such an exercise is twofold: first, to determine whether the overall long-term impacts of all related past, present, and probable future projects are cumulatively significant; and second, to determine whether the IPM Program's incremental contribution to any such cumulatively significant impacts would be "cumulatively considerable" (and therefore significant). (See State CEQA Guidelines Sections 15130[a]–[b], Section 15355[b], and Section 15064[h]; and *Communities for a Better Environment v. California Resources Agenc*y [2002] 103 Cal. App. 4th 98, 120).

Cumulative impacts are defined in State CEQA Guidelines Section 15355 as "two or more individual effects which, when considered together, are considerable or which compound or increase other environmental impacts." A cumulative impact occurs from "the change in the environment which results from the incremental impact of the project when added to other closely related past, present, and reasonably foreseeable probable future projects. Cumulative impacts can result from individually minor but collectively significant projects taking place over a period of time" (State CEQA Guidelines Section 15355[b]).

In discussing cumulative impacts, the State CEQA Guidelines outline two approaches for characterizing the projects that occur in the vicinity of a proposed project:

- Project list: A list of past, present, and probable future projects producing related or cumulative impacts, including, if necessary, projects outside the control of the agency (CEQA Guidelines Section 15130(b)(1)(A)).
- Summary of projections: A summary of projections contained in an adopted local, regional, or statewide plan, or related planning document, that describes or evaluates conditions contributing to the cumulative effect (CEQA Guidelines Section 15130(b)(1)(B)). This summary can be supplemented with additional information, including a regional modeling program.

This document uses both approaches, depending on which one is more appropriate for the resource area being analyzed. The approach selected depends on the resource area and the nature and character of expected impacts. The rationale for selecting an approach is provided in the cumulative impacts discussion for each resource area.

4.2 CUMULATIVE SETTING

4.2.1 Geographic Scope

A review of cumulative impacts is limited to Santa Clara County, the jurisdiction in which IPM Program activities would occur. The geographic area that could be affected by the IPM Program and is appropriate for a cumulative impact analysis varies depending on the environmental resource topic, as presented in Table 4-1.

Table 4-1 Geographic Scope of Cumulative Impacts

Resource Topic	Geographic Area
Aesthetics	Immediate vicinity
Biological Resources	Regional
Hazards and Hazardous Materials	Immediate vicinity
Hydrology and Water Quality	Regional watersheds
Cultural and Tribal Cultural Resources	Regional
Recreation	Regional
Wildfire	Regional and immediate vicinity

Source: Compiled by Ascent Environmental in 2019

4.2.2 Regional Planning Environment

The IPM Program does not include the construction of any new or expanded structures or built facilities, and physical activities would be limited to the pest management activities described in Chapter 2, "Program Description," within the IPM Program Area. Thus, related local, regional, and statewide plans, or related planning documents considered in the cumulative analysis include other pest management programs and the Santa Clara Valley Habitat Plan, implementation of which would affect similar resources as the IPM Program in similar ways. Although the IPM Program Area includes areas within the jurisdiction of Santa Clara County and the cities of San Jose and Morgan Hill, the general plans of these jurisdictions were not included in the cumulative analysis because general plans guide future development and growth, which would not occur under the IPM Program.

Related past, present, and reasonably foreseeable future plans considered for the IPM Program cumulative effects analysis include the following, each of which is described in the sections below.

- California Department of Food and Agriculture's (CDFA) Statewide Plant Pest Prevention and Management Program
- Santa Clara County Integrated Pest Management Program
- Midpeninsula Regional Open Space District Integrated Pest Management Program
- Santa Clara Valley Habitat Plan

STATEWIDE PEST PREVENTION AND MANAGEMENT PROGRAM

The overarching goal of the Statewide Pest Prevention and Management Program (Statewide Program) is to protect California's agriculture from damage caused by invasive plant pests. Proposed activities may occur anywhere that a pest is or may be found in agricultural or nursery settings, residential communities, border protection stations, and sometimes outside California for activities conducted by others besides CDFA, in response to restrictions on importation of potentially infested commodities and equipment from outside the state (CDFA 2014).

The Statewide Program encompasses a range of prevention, management, and regulatory activities. Pest management activities covered under the Statewide Program include physical, biological, and chemical management activities. Physical management activities include detection trapping and field work to identify the presence of pests. Biological management activities include the use of biological control agents and the sterile insect technique. Chemical management activities include the use of pesticides using various methods such as placed inside traps, spot applications, soil applications, fumigation, and foliar spray (CDFA 2014).

SANTA CLARA COUNTY INTEGRATED PEST MANAGEMENT PROGRAM

Santa Clara County's Integrated Pest Management Program is governed by County Ordinance Code Division B-28, "Integrated Pest Management and Pesticide Use." The ordinance governs and guides the control of pests on properties owned and managed by the county, such as regional parks, roads, airports, office complexes, hospitals, correctional facilities, and animal shelters. Common pests in these locations include ants, bedbugs, flies, roaches, wasps, termites, rodents, birds, weeds, and plant diseases. The ordinance does not apply to private property or other jurisdictions. Pest management methods include pest proofing, improved sanitation and housekeeping, trapping, mulching, hand-pulling, trimming, mowing, cattle and goat grazing, prescribed fire, and chemical treatment involving herbicides, fungicides, rodenticides, insecticides, and carbon dioxide injectors for ground squirrels and gophers (Santa Clara County 2019).

MIDPENINSULA REGIONAL OPEN SPACE DISTRICT INTEGRATED PEST MANAGEMENT PROGRAM

The Midpeninsula Regional Open Space District (District) Integrated Pest Management Program directs pest management on District properties, which cover 550 square miles, mostly in unincorporated portions of San Mateo, Santa Clara, and Santa Cruz counties. The Integrated Pest Management Program addresses pest management within five IPM management categories: buildings, recreational facilities, fuel management areas, rangelands and agricultural properties, and natural areas. Pest management activities consist of manual and mechanical control treatments (e.g., pulling, digging, mowing, green flaming) and chemical treatments using herbicides, fungicides, rodenticides, insecticides, and adjuvants/surfactants applied via baits, spot spraying, foliar spraying, cut-stump applications, and injecting (District 2014).

SANTA CLARA VALLEY HABITAT PLAN

The Santa Clara Valley Habitat Plan (Habitat Plan) provides a framework for promoting the protection and recovery of natural resources, including endangered species, while streamlining the permitting process for planned development, infrastructure, and maintenance activities. Rather than separately permitting and mitigating individual projects, the Plan evaluates natural-resource impacts and mitigation requirements comprehensively in a way that is more efficient and effective for at-risk species and their essential habitats. This approach allows the Habitat Plan Permittees to streamline mitigation requirements into one comprehensive program.

The Habitat Plan provides take authorization for 18 listed and non-listed species (i.e., covered species), and includes conservation measures to protect all 18 species under the Habitat Plan. As Permittees under the Habitat Plan, Santa Clara County, Santa Clara Valley Water District, Santa Clara Valley Transportation Authority, and the cities of Gilroy, Morgan Hill, and San Jose have endangered-species permits for the 18 covered species for activities and projects that are covered by the Habitat Plan. Covered activities in the Habitat Plan fall into seven general categories: urban development, in-stream capital projects, in-stream operations and maintenance, rural capital projects, rural operations and maintenance, rural development, and conservation strategy implementation (i.e., activities within the lands managed, enhanced, restored, and monitored to conserve the natural resources targeted by the Habitat Plan). The Habitat Plan provides a more efficient process for protecting natural resources by creating new habitat reserves that are larger in scale, more ecologically valuable, and easier to manage than individual mitigation sites created without a comprehensive Habitat Plan in place. The Habitat Plan covers 519,506 acres of land within Santa Clara County (Santa Clara County et. al. 2012a).

4.2.3 Related Projects

The Authority and other local agencies manage open space and park lands and conduct similar pest management and maintenance activities. Related local and regional projects considered in the cumulative analysis include control of invasive plants and animals; maintenance of existing buildings, roads, and recreational facilities; and restoration, which could affect the similar resources as the IPM Program in similar ways. Given the limited geographic scope of potential cumulative impacts related to environmental resources that are evaluated using the project list approach (refer to Table 4-1), only projects within or immediately adjacent to the IPM Program Area are considered for the project list based cumulative impact analysis. The project list was compiled by querying the following agency websites for related past, ongoing, or planned projects:

- The Authority
- City of Morgan Hill Parks Department
- City of San Jose Parks Department
- Santa Clara County Parks Department
- Midpeninsula Regional Open Space District
- Peninsula Open Space Trust
- California State Parks

The related past, present, and reasonably foreseeable future projects that were identified and are considered in the cumulative impact analysis are presented in Table 4-2. Although no related parks department, Peninsula Open Space Trust, or California State Parks projects were identified within or immediately adjacent to the IPM Program Area, county and state parks are located adjacent to IPM Program Area preserves and past activities have influenced existing environmental conditions.

Table 4-2 Cumulative Project List for the IPM Program

Project Name	Agency	Project Description	Location
Facilities Maintenance and Improvement Project	Authority	Install electric vehicle chargers at Authority facilities. Anticipated in 2022.	Authority lands
Operations and Maintenance Activities	Authority	Continue to implement operations and maintenance activities. Activities include road and trail maintenance; vegetation management around structures, parking lots, and other paved surfaces; and vegetation management in orchards. Ongoing activity.	Authority lands
Grazing	Authority	Continue grazing management and monitoring activities on Authority-managed properties where grazing occurs. These activities include the installation of wildlife-friendly fencing and gates, spring enhancements, repair of waterlines, and replacement of water troughs and tanks. Ongoing activity.	Authority lands
Fuels Management	Authority	Develop a wildland fuels management policy and plan for identifying and prioritizing fuel reduction treatments to reduce wildfire risk and achieve natural resource goals across Authority preserves. Anticipated in2021-2022.	Authority lands
Malech Road Public Access Project	Authority	Implement several new public access features on the 29-acre Malech Road project site including the construction of a parking lot, restroom facility, trailhead kiosk, and interpretive station. Anticipated in 2022-2023.	Coyote Ridge OSP
Coyote Ridge Open Space Preserve Phase 1 Project	Authority	Enhance public access by improving existing ranch roads, constructing a 1-mile segment of trail, and installing trail facilities including a creek crossing, rest areas, overlooks, and interpretive stations. Anticipated in 2022-2023.	Coyote Ridge OSP
Improved North Meadow Public Access Project	Authority	Upgrade Heart's Delight Trail to outdoor developed areas accessibility guidelines standards; add trail amenities improve equestrian parking lot surfacing. Anticipated in 2022-2023.	Coyote Valley OSP
North Coyote Valley Conservation Area Project	Authority and POST	Habitat restoration and public access improvements on 1,000 acres in North Coyote Valley. First phase anticipated in 2025.	North Coyote Valley

Project Name	Agency	Project Description	Location
Pajaro River Riparian Habitat Restoration Project	Authority	Enhance streambanks in the Pajaro River Agricultural Preserve by re-shaping banks and planting native riparian vegetation. Anticipated in 2021-2024.	Pajaro River Agricultural Preserve
Llagas Creek Bridge and Day Use Area Project	Authority	Install bridge over Llagas Creek; construct 1,000-foot trail and day-use area amenities in adjacent meadow. Anticipated in 2022.	Rancho Canada del Oro OSP
Blair Ranch Public Access Project	Authority	Enhance public access to the Blair Ranch area by constructing a staging area, trailhead kiosk, improving existing ranch roads, and construction of new trails. Anticipated in 2025.	Rancho Canada del Oro OSP
Blair Ranch Pond Enhancement	Authority	Enhance ponds for listed species. Anticipated in 2021.	Rancho Canada del Oro OSP
Additional Parking Project	Authority	Expand Sierra Road Staging Area to accommodate additional parking. Anticipated in 2024.	Sierra Vista OSP
Regional Trail Connections, Mount Umunhum-to-Sea-Trail	District	The Mount Umunhum-to-Sea-Trail would pass through the District's Sierra Azul OSP and run adjacent to the southern boundary of the Authority's Upper Uvas Creek OSP.	Upper Uvas Creek OSP

Note: Authority = Santa Clara Valley Open Space Authority; OSP = Open Space Preserve; District = Midpeninsula Regional Open Space.

Source: Compiled by Ascent Environmental in 2019 and 2021

4.3 ANALYSIS OF CUMULATIVE IMPACTS

The following sections contain a discussion of the cumulative effects anticipated from implementation of the IPM Program, together with related projects and plans in the cumulative project area, for each of the seven environmental issue areas evaluated in this PEIR. The analysis conforms with Section 15130(b) of the State CEQA Guidelines, which specifies that the "discussion of cumulative impacts shall reflect the severity of the impacts and their likelihood of occurrence, but the discussion need not provide as great detail as is provided for the effects attributable to the project alone. The discussion should be guided by the standards of practicality and reasonableness, and should focus on the cumulative impact to which the identified other projects contribute rather than the attributes of other projects which do not contribute to the cumulative impact."

When considered in relation to other reasonably foreseeable projects, cumulative impacts to some resources would be significant and more severe than those caused by the proposed IPM Program alone. For purposes of this PEIR, the IPM Program would result in a significant cumulative effect if:

- the cumulative effects of related projects (past, current, and probable future projects) are already significant and implementation of the IPM Program makes a considerable contribution to the effect. The standards used herein to determine a considerable contribution are that either the impact must be substantial or must exceed an established threshold of significance; or
- the cumulative effects of related projects (past, current, and probable future projects) are not significant but the incremental impact of implementing the IPM Program is substantial enough, when added to the cumulative effects of related projects, to result in a new cumulatively significant impact.

This cumulative analysis assumes that all mitigation measures identified in Chapter 3 to mitigate IPM Program impacts are adopted and implemented, as well as the environmental protection measures (EPMs) that have been incorporated into the IPM Program. The analysis herein analyzes whether, after implementation of IPM Program-specific mitigation measures and EPMs that minimize environmental effects, the residual impacts of the IPM Program would contribute considerably to existing/anticipated (without the IPM Program) cumulatively significant effects or, if the cumulative effects of related projects are not significant, would cause a cumulatively significant impact.

4.3.1 Resources with No Impacts

As discussed in Section 3.1.1, "Effects Found Not to be Significant," the IPM Program would have no notable or significant effect to the following resources:

- Air quality and greenhouse gas emissions,
- Agricultural and forestry resources,
- Energy,
- Geology and soils,
- Land use and planning,
- Mineral resources,
- Noise,
- Population and Housing,
- Public services,
- Transportation, and
- Utilities and service systems.

Therefore, implementation of the IPM Program would not contribute to a cumulative impact related to these resource areas and are not discussed in this section.

4.3.2 Aesthetics

As discussed in Section 3.2.3, "Aesthetics, Issues Not Discussed Further," although two officially designated state scenic highways are located in the vicinity of the IPM Program Area, they do not provide views of the IPM Program Area due to distance, intervening topography, and thick vegetation. Implementation of the IPM Program would not damage scenic resources within a state scenic highway, or substantially alter views from a state scenic highway. In addition, no substantial sources of new light or glare would occur with implementation of the IPM Program. Therefore, the IPM Program would not contribute to cumulative impacts related to these issues and these issues are not discussed further.

SCENIC VISTAS AND VISUAL CHARACTER/QUALITY

The list approach was used to evaluate potential cumulative impacts because aesthetic and visual resource impacts occur within a given viewshed and can be very localized, particularly in natural areas where trees and other vegetation can limit the extent of available views. The geographic extent for considering cumulative impacts to aesthetics includes all projects within the same viewshed (i.e., area visible from a viewer's location) of the IPM Program Area. All projects listed in Table 4-2 are within the cumulative geographic scope of analysis because they are either within or adjacent to the IPM Program Area and thus would be within the same viewshed. The projects listed in Table 4-2 would involve the construction of new buildings and facilities, installation of new trails, vegetation removal, and the temporary presence of heavy mechanical equipment in open space lands, which could affect the visual character and quality of these areas. Thus, the cumulative scenario for visual resources in the region is considered significant.

As discussed in Impact 3.2-1, ~~while~~ the IPM Program could result in temporary effects on visual resources from the use of equipment in the IPM Program Area. However, its presence would be temporary, lasting up to one week at a treatment project site, and often would not be visible given that the majority of IPM Program Area preserves are closed to the public and would not dominate long range or panoramic views from a scenic vista. Furthermore, IPM activities would help re-establish native vegetation patterns and remove pests, likely improving visual quality of the preserves. Implementation of the IPM Program would not result in adverse effects on scenic vistas or substantially degrade the visual character or quality of the site and its surrounding areas. Therefore, the IPM Program's incremental contribution to visual resource impacts **would not be cumulatively considerable**.

4.3.3 Biological Resources

As discussed in Section 3.3.3, “Biological Resources, Issues Not Discussed Further” implementation of the IPM Program would not modify or remove habitats to the extent that these habitats would be unsuitable for use for the movement by wildlife or use as nursery sites, nor does the IPM Program include the construction of any permanent barriers that could obstruct wildlife movement. Accordingly, there would be no substantial effects on the movement of resident or migratory species though the IPM Program Area or impediment of the use of native wildlife nursery sites. The IPM Program would not contribute to cumulative impacts related to these issues and these issues are not discussed further.

The geographic scope for the biological resources cumulative analysis is regional because biological resources occurring within the IPM Program Area are also typically found throughout open space lands in the region and impacts to special-status species and habitat within the IPM Program Area could have population-wide effects that extend beyond the IPM Program Area. Thus, the analysis for all potential cumulative biological resource impacts uses the projection approach.

SPECIAL-STATUS SPECIES

The Habitat Plan is intended to address the conservation needs of 18 covered species while allowing for specific covered activities to occur within the Plan Area, which encompasses the majority of Santa Clara County, including the IPM Program Area (Santa Clara County et. al 2012a). Because the Santa Clara Valley Habitat Plan Final Environmental Impact Report/Environmental Impact Statement (Habitat Plan EIR/EIS) evaluates the potential impacts of Habitat Plan implementation, which includes the IPM Program Area and most of the activities proposed in the IPM Program, it is used to determine if the cumulative scenario is significant for special-status species impacts. According to the Habitat Plan EIR/EIS, cumulative impacts were determined to be significant for the San Joaquin kitfox (*Vulpis macrotis mutica*) and the American badger (*Taxidea taxus*) due to regional loss of habitat, barriers to movement, pesticide toxicity and other factors (Santa Clara County et. al 2012b). Impacts to other special-status species were not determined to be cumulatively significant and because the IPM Program would not result in any significant and unavoidable impacts to any special-status species, it would not cause a cumulatively significant impact. In addition, this PEIR considers the Crotch bumble bee and monarch butterfly to be special-status species due to evidence of a substantial decline in populations, which are not covered in the Habitat Plan EIR/EIS. For these reasons, the cumulative scenario for San Joaquin kitfox, American badger, Crotch bumble bee, and monarch butterfly is considered significant.

As discussed in Impact 3.3-2, IPM Program activities have the potential to result in the incidental injury or mortality of San Joaquin kitfox, American badger, Crotch bumble bee, and monarch butterfly. Impacts to monarch butterflies as a result of the IPM Program were determined to be less than significant, and EPMs BIO-9 through BIO-11 further reduce and avoid impacts to monarch butterflies and their host plants by requiring the avoidance of overwintering sites if ever present, pre-treatment surveys for and avoidance of monarch butterfly host plants, and limitations regarding herbicide use within 15 feet of host plants. Mitigation Measure 3.3-2j requires the Authority to implement all applicable permit conditions required by the Habitat Plan if take coverage is obtained for San Joaquin kitfox, to consult with USFWS before application of pesticides within suitable habitat for San Joaquin kitfox to avoid impacts to the species, and if take coverage under the Habitat Plan is not obtained, the Authority would avoid impacts by surveying for dens and establishing a no-disturbance buffer if dens are found. If a natal den is discovered within 200 feet of a treatment site, all activity would cease, and the Authority would contact the USFWS and CDFW to consult about potential avoidance measures before activities could occur. Implementation of Mitigation Measure 3.3-2k would avoid impacts to American badgers by requiring pre-treatment surveys for potential American badger dens and prohibiting treatment activities within a 50-foot buffer around each den during the non-breeding season or within a 100-foot buffer around dens during the period when pups are potentially in the den (February 15 through July 1). Implementation of Mitigation Measure 3.3-2b would avoid impacts to Crotch bumble bees by requiring surveys for bumble bees and nest colonies prior to ground disturbing IPM treatments and flagging and avoidance of any identified colonies. It also requires that IPM treatments are conducted such that the entirety of floral resources are not removed during the period when colonies may be present, and untreated portions of occupied habitat are retained adjacent to treatment areas to provide floral resources and refuge for Crotch bumble bees. Therefore, with implementation of these EPMs and mitigation measures, significant impacts to the San Joaquin kitfox, American Badger, Crotch bumble bee, and monarch butterfly would be avoided or substantially minimized such that the IPM Program's incremental contribution to the cumulative impact **would not be cumulatively considerable**.

RIPARIAN HABITAT AND OTHER SENSITIVE NATURAL COMMUNITIES

According to the Habitat Plan EIR/EIS, urbanization and associated infrastructure development in the region has resulted in and is projected to continue to result in impacts to and loss of riparian habitat (Santa Clara County et. al 2012b). The plans and programs listed in Section 4.2.2, "Regional Planning Environment," include activities that require vegetation removal, use of equipment and vehicles in natural areas, and pesticide use, which could damage riparian habitat or other sensitive natural communities if conducted in those areas. However, the plans and programs have been developed to improve habitat function through invasive species removal, which would likely result in habitat improvement within sensitive communities through the removal of invasive plants that compete with native vegetation for resources. Furthermore, none of the plans or programs would result in new development or urbanization that would permanently convert riparian habitat and other sensitive communities to urban uses. Thus, the cumulative scenario for riparian habitat and other sensitive natural communities is not considered significant. Similarly, the IPM Program would not permanently convert any sensitive natural communities to urban uses and is anticipated to improve habitat through invasive species removal. Therefore, the IPM Program would not create a cumulatively significant impact and there is **no cumulative impact**.

FEDERALLY PROTECTED WETLANDS AND WATERS

According to the Habitat Plan EIR/EIS, urbanization and associated infrastructure development in the region has resulted in and is projected to continue to result in impacts to federally protected wetlands and other waters (Santa Clara County et. al 2012b). The plans and programs listed in Section 4.2.2, "Regional Planning Environment," include manual, mechanical, and chemical activities that may be conducted near aquatic resources, which could result in runoff of sediment and pesticides to potentially protected wetlands and other waters. Thus, the cumulative scenario for federally protected wetland and other waters in the region is considered significant.

As discussed in Impact 3.3-4, treatments implemented under the IPM Program have the potential to result in runoff of sediment and pesticides to potentially protected wetlands and other waters. In addition, aquatic invasive animal control under the IPM Program would result in temporary fill and dewatering of potentially protected state and federal wetlands and other waters. However, the Authority would implement EPMs that prohibit broadcast spraying of herbicides within 50 feet of aquatic resources and ground disturbing mechanical treatments or any chemical treatments within 15 feet of any aquatic features (EPM BIO-1 and HAZ-5), require specific methods for safe handling of all pesticides to minimize accidental spills (EPM HAZ-4), and prohibit herbicide applications during high winds or precipitation to minimize the potential for herbicide drift or off-site runoff (EPM HAZ-5). These EPMs would minimize the potential for water quality effects from IPM treatments and no substantial degradation of any waters would occur. In addition, before conducting aquatic invasive animal control, the Authority would obtain all necessary permits, including a Clean Water Act Section 404 permit and Section 401 water quality certification. For permitted activities occurring in protected waters, the Authority would be required to meet a standard of no net loss of amount or function of wetlands or other waters. For these reasons, the IPM Program's incremental contribution to the cumulative wetlands impact **would not be cumulatively considerable**.

CONFLICTS WITH LOCAL POLICIES OR THE HABITAT PLAN

Portions of the IPM Program Area are within the City of San Jose, City of Morgan Hill, and Santa Clara County. Each jurisdictions' general plan and/or code of ordinances contains provisions for the protection of special-status species, sensitive communities and riparian habitats, waters, and trees. Projects occurring within these jurisdictions would be required to comply with these policies and ordinances protecting biological resources unless exceptions are granted (e.g., hazard trees in Santa Clara County). Similarly, projects occurring within the Plan Area of the Habitat Plan would be required to assess and mitigate potential biological resource impacts or follow conservation measures from the Habitat Plan in the case of Habitat Plan Permittee projects. For these reasons, conflicts with local policies or the Habitat Plan do not occur such that a significant cumulative impact scenario would result. Similarly, the IPM Program would be consistent with applicable local policies for biological resource protection and would follow the applicable conservation measures of the Habitat Plan. Therefore, the IPM Program would not create cumulative impacts related to conflicts with local policies or habitat conservation plans and there is **no cumulative impact**.

4.3.4 Hazards and Hazardous Materials

As discussed in Section 3.4.3, "Hazards and Hazardous Materials, Issues Not Discussed Further," implementation of the IPM Program would not result in hazardous materials impacts to schools; result in airport-related safety hazards or excessive noise for people residing or working in the area; nor would it impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan. Therefore, the IPM Program would not contribute to cumulative impacts related to these issues and these issues are not discussed further. Cumulative impacts related to the exposure of people or structures to risks from wildland fires are addressed in Section 4.3.8, "Wildfire." Cumulative impacts to special-status species and watercourses from hazardous materials are addressed in Section 4.3.3, "Biological Resources" and Section 4.3.5, "Hydrology and Water Quality."

Hazard and hazardous materials impacts tend to be site-specific and highly localized. Therefore, the cumulative hazards and hazardous materials analysis uses the list approach. The geographic scope of hazards and hazardous materials cumulative impacts would be the area within 100 feet of the IPM Program Area, because there is low risk for a geographically large and dispersed hazardous material spill or release as a result of the IPM Program.

HAZARDOUS MATERIALS USE OR RELEASE

All projects listed in Table 4-2 are within the cumulative geographic scope for hazardous materials use or release. The types of construction, grazing and fuel management techniques, restoration activities, and maintenance projects that would occur may involve the routine use and storage of small quantities of common household hazardous materials such as fuels, oils, and lubricants, which would be used to operate mechanical equipment and vehicles. However, no large quantities of hazardous materials would be transported, used, or stored under any of the projects listed in Table 4-2 and no large hazardous materials spills or dispersal could occur. Furthermore, these projects would occur within open space areas and typically far from urban or residential areas where large quantities of people could be present. In addition, the use of these common household hazardous materials is subject to numerous laws, regulations, and policies that control the use of hazardous materials and protect public health and safety. The Authority and the District, which are the agencies responsible for implementing the projects listed in Table 4-2, would comply with laws, regulations, and policies relevant to the use, transport, storage, and disposal of hazardous materials to minimize potential health risks. The projects listed in Table 4-2 do not involve the use of pesticides; thus, there is no potential for the IPM Program's pesticide-related impacts to cumulatively combine with those projects. For these reasons, the cumulative scenario is not considered significant. Similarly, the IPM Program would use small quantities of common household hazardous materials according to applicable laws and regulations and no substantial risk related to transport, use, storage, or accidental spills would result. Pesticides under the IPM Program would be used as a last resort to control invasive plants and animals. EPMs would be implemented requiring that herbicides be applied according to the manufacturer's label directions and to avoid spills (EPM HAZ-4) and requiring specific weather parameters to minimize potential herbicide drift and off-site runoff (EPM HAZ-5). Therefore, the IPM Program would not create cumulative impacts related to hazardous materials use or accidental release and there is **no cumulative impact**.

DISTRUBANCE TO KNOWN HAZARDOUS MATERIALS SITES

As discussed in Impact 3.4.2 in Section 3.4, "Hazards and Hazardous Materials," there is one known hazardous materials site with potential soil contamination in the IPM Program Area, the Wright Mine in Rancho Canada del Oro Open Space Preserve. Given its site-specific nature, and that no other known hazardous materials sites are located in the IPM Program Area, only ground disturbing activities occurring within the immediate vicinity of the known hazardous materials site are within the cumulative scope for disturbance to hazardous materials sites. The potential for other ground disturbing activities to occur in the immediate vicinity of the known hazardous materials site, which is in an undeveloped and vegetated portion of Rancho Canada del Oro Open Space Preserve, is low. There are no currently proposed ground-disturbing activities in this area. In addition, Mitigation Measure 3.4-2 would be implemented, which requires that the Authority flag the hazardous material site in the IPM Program Area prior to ground disturbing treatments in the vicinity of the site, and prohibits ground disturbing IPM activities within 100 feet of the site. Alternatively, if the Authority determines that there is no potential for contamination at the site in coordination with the Central Coast RWQCB, then no flagging would be necessary and ground disturbing treatments could occur. Because the hazardous waste site would be flagged and avoided, unless it is determined that no hazardous materials are present in soils, no exposure-related risks associated with the disturbance of a hazardous waste site to the public or environment would occur. Therefore, the IPM Program would not create cumulative impacts related to disturbance to known hazardous materials sites and there is **no cumulative impact**.

4.3.5 Hydrology and Water Quality

As discussed in Section 3.5.3, "Hydrology and Water Quality, Issues Not Discussed Further," implementation of the IPM Program would not interfere with groundwater recharge, decrease groundwater supplies through extraction, alter existing drainage patterns, and release significant pollutants as a result of seiche or tsunami inundation. Therefore, the IPM Program would not contribute to cumulative impacts related to these issues and these issues are not discussed further.

Given the geographic extent of the IPM Program Area and that water quality effects tend to be regional in nature and may span entire watersheds, the projection approach is used to evaluate all potential cumulative hydrology and water quality impacts.

WATER QUALITY

Several impaired water bodies exist within the Santa Clara County region, such as Anderson Reservoir, Coyote Reservoir, San Felipe Creek, Alamitos Creek, Guadalupe Creek, Calero Reservoir, Uvas Reservoir, and Los Gatos Creek (SWRCB 2017a; 2017b). The plans and programs listed in Section 4.2.2, "Regional Planning Environment," include activities that may require the use of heavy mechanical equipment, which could disturb soils and contribute to runoff into surface waters. In addition, these activities may involve the use of gasoline, diesel fuel, and oils to operate mechanical equipment and the use of pesticides to manage invasive species, which have the potential to leak or spill and enter nearby water bodies in runoff, some of which may be impaired. Thus, the cumulative scenario for water quality in the region is considered significant.

As discussed in Impacts 3.5-1 and 3.5-2, the IPM Program includes manual, mechanical, and chemical treatment activities that have the potential to affect water quality. Manual treatments involving weed mats could result in the introduction of inorganic materials to nearby water bodies. Mechanical treatments could disturb soils and have the potential to leak or spill gasoline, diesel fuel, and oils into nearby water bodies. Chemical treatments using herbicides have the potential to contaminate surface or groundwater quality if used in close proximity to surface waters, spilled, or used under the wrong conditions. Several EPMs would be implemented to minimize the potential impacts to water quality, including prohibiting broadcast spraying of herbicides within 50 feet of aquatic resources (unless the compound is specifically registered for aquatic use) and ground disturbing mechanical treatments or any chemical treatment within 15 feet of any aquatic feature (EPM BIO-1 and HAZ-5); requiring daily equipment checks for leaking equipment when in use and immediately removing any equipment found to be leaking (EPM HAZ-1); and requiring that herbicides are applied according to the manufacturer's label directions and consistent with EPMs HAZ-4 and HAZ-5 which protect surface and groundwaters through measures to minimize herbicide drift and off-site runoff, and ensure proper storage, handling, and cleanup. Accordingly, the potential impacts to water quality from IPM Program implementation would be avoided and minimized and the incremental contribution to cumulative water quality impacts **would not be cumulatively considerable**.

FLOODING

As described in Section 3.5.2, "Environmental Setting," flood hazard areas within the county are located within the city of San Jose and in areas near existing creeks and streams. The plans and programs listed in Section 4.2.2, "Regional Planning Environment," include activities that would use mechanical equipment and pesticides. Gasoline, diesel fuel, and oils used to operate mechanical equipment have the potential to leak onto areas near creeks and streams when in use and pesticide treatment treatments could occur near creeks and streams and remain in the environment until they naturally degrade. During flood events, it is possible that inundation of areas near creeks and streams could result in the release of any pollutants that are present. The Santa Clara County General Plan indicates that there is only a one percent chance of a flood occurring each year that would be capable of creating substantial flooding along creeks (Santa Clara County 1994); therefore, the risk of a flood is low. Nonetheless, if a large flood were to occur, many pollutants would likely be released in the county and therefore, the cumulative scenario is considered significant.

As discussed in Impact 3.5-3, herbicides, pesticides, fuels, and other materials for proposed IPM activities would be stored at two field offices that are currently used to store these types of materials for existing IPM activities. Equipment would be inspected daily for leaks to prevent gasoline, diesel fuel, lubricating oils, or grease from entering the environment (EPM HAZ-1); and only pesticides registered for aquatic use would be broadcast sprayed within 50 feet of aquatic resources or within 100 feet of aquatic resources when precipitation is forecasted within 24 hours (EPM HAZ-5 and BIO-1). Additionally, no chemical or ground disturbing mechanical treatments would occur within 15 feet of any aquatic resource and all terrestrial treatment areas will be surveyed for the presence of aquatic resources (EPM BIO-1). Given implementation of EPMs, the low likelihood of flooding, and because the IPM Program would not result in a substantial increase in the presence of potential pollutants in the IPM Program Area, the IPM Program's incremental contribution to flood-related water quality impacts **would not be cumulatively considerable**.

4.3.6 Cultural and Tribal Cultural Resources

Because all significant cultural and tribal cultural resources are unique and nonrenewable members of finite classes, all adverse effects or negative impacts erode a dwindling resource base. The loss of any one archaeological or historic site affects all others in a region because these resources are best understood in the context of the entirety of the cultural system of which they are a part. Thus, the cumulative context for the cultural resources analysis uses the projection approach and considers the broad regional system of which the resources are a part.

HISTORIC RESOURCES

The plans and programs listed in Section 4.2.2, "Regional Planning Environment," could involve pest management activities in buildings and structures, which have the potential to alter historic resources. Given increasing development in the region and the potential for the plans and programs listed in Section 4.2.2 to affect historic resources, the cumulative scenario for historic resource impacts in the region would be considered significant.

As discussed in Impact 3.6-1, historic and prehistoric resources occur within and near the IPM Program Area, and additional historic resources may be present that have not yet been fully evaluated for historical significance. IPM treatment activities that are proposed for buildings and structures that involve implementing barriers to entry or building retrofits could adversely impact historical resources. However, implementation of Mitigation Measure 3.6-1 requires that before implementation of treatment activities that would be conducted within or near historic-age (50 years or older) buildings, the structures shall be surveyed by an architectural historian who meets the Secretary of the Interior's Standards. If structures are determined to be eligible for the California Register of Historic Resources, IPM

Program activities will follow the Secretary of the Interior's guidelines and standards for preserving, rehabilitating, restoring, and reconstructing historic buildings. Accordingly, potential impacts to historic resources from IPM Program implementation would be avoided such that historic resources would maintain their historical significance. Therefore, the IPM Program's incremental contribution to cumulative historic resource impacts **would not be cumulatively considerable**.

UNIQUE ARCHAEOLOGICAL RESOURCES

The plans and programs listed in Section 4.2.2, "Regional Planning Environment," could involve ground disturbing activities, which have the potential to affect archaeological resources, if present. Given increasing development in the region and the potential for the plans and programs listed in Section 4.2.2 to affect archaeological resources, the cumulative scenario for archaeological resource impacts in the region would be considered significant.

As discussed in Impact 3.6-2, ground-disturbing activities implemented under the IPM program could result in the discovery or damage of archaeological resources as defined in State CEQA Guidelines Section 15064.5. However, implementation of Mitigation Measures 3.6-2a and 3.6-2b require archaeological surveys to be conducted by a qualified archaeologist before ground-disturbing activities, halting of ground-disturbing activities if any prehistoric or historic-era subsurface archaeological resources are found, retaining a qualified archaeologist to assess the significance of the find, and implementing appropriate procedures to protect the integrity of the resource and ensure that no additional resources are affected. Thus, potential impacts to archaeological resources from IPM Program implementation would be avoided and minimized such that archaeological resources would maintain their integrity. Therefore, the IPM Program's incremental contribution to cumulative archaeological resource impacts **would not be cumulatively considerable**.

HUMAN REMAINS

California Health and Safety Code Sections 7050.5 and 7052 and California Public Resources Code Section 5097 protect Native American human burials, skeletal remains, and items associated with Native American burials from vandalism and inadvertent destruction. Additionally, the Santa Clara County Ordinance Code includes Sections B6-18 through B6-20, which describe the protocol should any human remains be uncovered during project activities. All projects within the state would be required to comply with state regulations and all projects within the County would also be required to comply with the County ordinance code. These regulations avoid or minimize the disturbance of human remains, and appropriately treat any remains that are discovered. Thus, a cumulative impact scenario does not exist for this impact. Similarly, the Authority would comply with California Health and Safety Code Sections 7050.5 and 7052 and California Public Resources Code Section 5097, which require the implementation of procedures to avoid and minimize the disturbance of human remains and the appropriate treatment any remains that are discovered. Therefore, the IPM Program would not create cumulative impacts related to the discovery of human remains and there is **no cumulative impact**.

TRIBAL CULTURAL RESOURCE

As described in Section 3.6.2, "Environmental Setting," the Native American Heritage Commission's (NAHC's) Sacred Lands File (SLF) search for the IPM Program returned positive results and Native American tribes have previously inhabited portions of the IPM Program Area. The plans and programs listed in Section 4.2.2, "Regional Planning Environment," could involve ground disturbing activities could result in the inadvertent discovery or damage of unknown tribal cultural resources, if present. Given increasing development in the region and the potential for the plans and programs listed in Section 4.2.2 to affect tribal cultural resources, the cumulative scenario for tribal cultural resources in the region would be considered significant.

As discussed in Impact 3.6-4, ground disturbing manual and mechanical IPM treatment activities, such as hoeing, digging, cultivating, and discing, could uncover archaeological resources if present within treatment areas, which may be considered tribal cultural resources. While this would be unlikely in agricultural areas because of previous soil and ground disturbance, it is possible in previously undisturbed areas. However, implementation of Mitigation Measure 3.6-2a and 3.6-2b would require archaeological records searches for newly acquired preserves and surveys in areas where known archaeological resources are present within treatment areas prior to ground disturbing treatments; and require all ground-disturbing activity within 100 feet of any surface or subsurface archaeological features or deposits, including locally darkened soil ("midden") that could conceal cultural deposits, be halted if discovered. A qualified professional archaeologist would be retained to assess the significance of any finds. If the qualified archaeologist determines the archaeological material to be Native American in nature, the Authority would contact the appropriate Native American tribe for their input on the preferred treatment of the find. Thus, potential impacts to tribal cultural resources from IPM Program implementation would be avoided and minimized such that tribal cultural resources would maintain their integrity. Therefore, the IPM Program's incremental contribution to cumulative archeological resource impacts **would not be cumulatively considerable.**

4.3.7 Recreation

As discussed in Section 3.7.3, "Recreation, Issues Not Discussed Further" the IPM Program would manage existing recreational lands and facilities owned by the Authority and would not require the construction or expansion of any recreational facilities, which could have an adverse physical effect on the environment. Therefore, the IPM Program would not contribute to cumulative impacts related to this issue and this issue is not discussed further.

DETERIORATION OF RECREATION FACILITIES

The projection approach was used to determine cumulative impacts related to the increased use of existing parks or other recreational facilities because potential impacts are regional in nature and would affect park resources outside of the immediate IPM Program Area. The plans and programs listed in Section 4.2.2, "Regional Planning Environment," would not be growth-inducing, and thus, would not be expected to generate increased demand for parks and recreational facilities. However, similar to the IPM Program, other pest management programs may require the use of heavy equipment and herbicides within public areas. Temporary closures of these public areas may be required for public safety, which could result in the displacement of visitors and increased use of other recreational facilities in the area. As described in Section 3.7.2, "Environmental Setting," regional recreational lands facilities are provided by several federal, state, and local agencies, including the U.S. Fish and Wildlife Service, California Department of Parks and Recreation, Santa Clara County Regional Park System, Midpeninsula Regional Open Space District, as well as by the Authority. Regional recreation facilities typically cover large areas and although temporary closures of certain park areas could occur, there would likely be others area of the same park available for public use or other regional facilities in the vicinity. In addition to the regional facilities provided by the above agencies, cities within the county provide local neighborhood park and recreational facilities. Given the site-specific and temporary nature of potential closures because of pest management activities and the availability of parks and recreational opportunities in the region, the cumulative scenario is not considered significant. Similarly, the IPM Program would result in minimal public closures, and in the long-term, pest control treatment activities would likely benefit public recreation by reducing the presence of nuisance pests, such as poison oak and wasps. Therefore, the IPM Program would not create cumulative impacts related to the deterioration of recreation facilities and there is **no cumulative impact**.

4.3.8 Wildfire

As discussed in Section 3.8.3, "Wildfire, Issues Not Discussed Further" the IPM Program would not alter potential emergency evacuation routes or impair an adopted emergency plan; would not result in new infrastructure that may exacerbate fire risk; and would not expose people or structures to downslope or downstream flooding or landslides as a result of runoff or drainage changes. Therefore, the IPM Program would not contribute to cumulative impacts related to these issues and these issues are not discussed further.

The approach for analyzing the potential wildfire related cumulative effects of the IPM Program differs by topic, as further described below.

WILDFIRE RISK

Wildfire risk and behavior is a product of several variables, primarily weather, vegetation, topography, and human influences, which intermix to produce local and regional fire regimes that affect how, when, and where fires burn. Furthermore, although wildfire ignition is site-specific, it can spread and produce smoke far outside of the initial area where it starts. Thus, the geographic scope for evaluating fire risk and the exposure of people to wildfire pollutants or the uncontrolled spread of wildfire is regional and uses the projection approach.

As described in Section 3.8.2, "Wildfire Environment within Santa Clara County," some areas of Santa Clara County, including portions of the IPM Program Area, are considered "high or extreme fire hazard areas" due to a combination of factors including climatic factors, such as rainfall, humidity, and wind patterns; the amount of naturally-occurring "fuel" for fires, such as brush, dead trees, and grasses that ignite easily and burn hotly; steepness of slopes; and inaccessibility and lack of available water supplies for fire suppression (Santa Clara County 1994). Climate change has exacerbated wildfire conditions through increased temperatures and extreme weather conditions. Human influence is another major factor that affects wildfire risk and behavior: implementation of other pest management programs in the region, listed in Section 4.2.2, "Regional Planning Environment," will likely use internal combustion engines within wildlands, which have the potential to create sparks and subsequent fire. Thus, the cumulative scenario for wildfire risk in the region is considered significant.

As discussed in Impact 3.8-1, pest management activities implemented under the IPM Program could result in accidental wildfire ignition risks from the use of vehicles and mechanical equipment in the IPM Program Area, and from the implementation of green flaming to treat vegetation on agricultural lands. However, several EPMs would be implemented to reduce the risk of wildfire ignition from treatment activities by properly maintaining all diesel- and gasoline-powered equipment (EPM HAZ-1), requiring spark arrestors (EPM HAZ-2), and prohibiting smoking in vegetated areas (EPM HAZ-3). Additionally, the IPM Program does not include any new housing or other new land uses where the public would congregate; there would be no new occupants that could be exposed to pollutant concentrations from a wildfire or the uncontrolled spread of wildfire as a result of the IPM Program. In the long-term, the IPM Program is expected by reduce wildfire risk by removing invasive and nuisance vegetation. Therefore, with implementation of EPMs; availability of fire protection services in the IPM Program Area; and anticipated fire risk reduction outcomes of the IPM Program; the IPM Program would not substantially exacerbate fire risk and expose people to the uncontrolled spread of wildfire or wildfire related pollutants. Therefore, the IPM Program's incremental contribution to exacerbating fire risk from implementation of pest management activities **would not be cumulatively considerable**.

POST-FIRE LANDSLIDE OR DEBRIS FLOW

The exposure of people or structures to significant risks due to downslope or downstream flooding or landslides as a result of post-fire slope instability is location specific and only projects within or immediately adjacent to the IPM Program Area could combine to result in cumulative impacts; thus, this impact uses the project list approach.

All projects listed in Table 4-2 are within the cumulative geographic scope of analysis for post-fire slope instability-related impacts because they are either within or adjacent to the IPM Program Area. The types of construction, grazing and fuel management activities, restoration, and maintenance projects may involve ground disturbing activities such as grading and vegetation removal on steep slopes which could destabilize soils and exacerbate post-fire landslide and debris flow hazards. While the majority of these projects are not anticipated to result in growth inducement, the Malech Road Public Access Project, Improved North Meadow Public Access Project, North Coyote Valley Conservation Area, and regional trail connections may result in new structures and additional visitors within or adjacent to the IPM Program Area. Because there could be destabilizing activities occurring on steep slopes in the IPM Program Area and there is a slightly increased potential that people or structures would be exposed to risks related to post-fire landslides or debris flow, the cumulative scenario is considered significant.

As discussed in Impact 3.8-2, implementation of the IPM Program would not place additional people or structures in the IPM Program Area and would not result in a substantial increase in post-fire flooding and landslide due to an increase in wildfire risk itself. Ground disturbing manual and mechanical IPM activities have the potential to destabilize soils but would generally not occur on steep slopes and would be replaced with spraying of herbicides when treatment is deemed necessary. In addition, the more ground disturbing (and potentially destabilizing) mechanical activities would occur on agricultural lands; these lands are generally flat and not susceptible to landslides or debris flow. Therefore, the IPM Program's incremental contribution to post-fire landslides or debris flow risks **would not be cumulatively considerable**.

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5 ALTERNATIVES ANALYSIS

5.1 INTRODUCTION

The California Environmental Quality Act (CEQA) Guidelines (State CEQA Guidelines) Section 15126.6[a] requires an Environmental Impact Report (EIR) to "describe a range of reasonable alternatives to the project, …[that] would feasibly attain most of the basic project objectives but would avoid or substantially lessen any of the significant effects, and evaluate the comparative merits of the alternatives." The purpose of this alternatives analysis is to determine whether or not an alternative to the proposed IPM Program would feasibly reduce or eliminate significant impacts, while meeting most of the basic objectives of the proposed IPM Program.

The range of alternatives studied in an EIR is governed by the "rule of reason," requiring evaluation of only those alternatives "necessary to permit a reasoned choice" (State CEQA Guidelines Section 15126.6[f]). Further, an agency "need not consider an alternative whose effect cannot be reasonably ascertained and whose implementation is remote and speculative" (State CEQA Guidelines Section 15126.6[f][3]). The analysis should focus on alternatives that are feasible, meaning that they may be accomplished in a successful manner within a reasonable period of time, taking economic, environmental, social, and technological factors into account. Alternatives that are remote or speculative or that do not feasibly meet most of the project objectives need not be discussed. Furthermore, the alternatives analyzed for a project should focus on reducing or avoiding significant environmental impacts associated with the project, as proposed.

The objectives of the proposed IPM Program are listed below. The evaluation of alternatives is conducted in the context of seeking to meet most of these objectives. Specific objectives of the IPM Program are to:

- develop and implement site-specific pest management strategies that are effective in controlling targeted pests while avoiding damage to natural resources, promoting visitor safety and enjoyment, and protecting human health;
- keep the interested public informed about treatment strategies, upcoming projects, and environmental and public health protection measures;
- inhibit the establishment of new invasive species on Authority preserves, such as new invasive plants in natural areas, rangelands, and agricultural properties;
- maintain an inventory of invasive species infestations, monitor treatment effectiveness, and incorporate relevant monitoring results into future treatment applications;
- implement an adaptive management framework to promote the long-term effectiveness of pest management activities; and
- develop and implement an IPM Manual to standardize pest management and IPM procedures.

5.2 SIGNIFICANT ENVIRONMENTAL IMPACTS OF THE IPM PROGRAM

The purpose of this section is to note the significant and potentially significant impacts to the environment that would occur with implementation of the proposed IPM Program, as described in Chapter 3 of this document. Potentially significant impacts were identified for biological resources (special-status wildlife), cultural and tribal cultural resources, and risk of exposure to contaminated soil. Implementation of mitigation measures identified in Chapter 3 would reduce these impacts to a less-than-significant level. See Chapter ES, "Executive Summary," for a detailed summary of the impact analysis, conclusions, and mitigation measures.

5.3 ALTERNATIVES CONSIDERED BUT NOT EVALUATED FURTHER

State CEQA Guidelines Section 15126.6(c) provides that an EIR "should also identify any alternatives that were considered by the lead agency but rejected as infeasible during the scoping process and briefly explain the reasons underlying the lead agency's determination. Among the factors that may be used to eliminate alternatives from detailed consideration in an EIR are: (i) failure to meet most of the basic project objectives, (ii) infeasibility, or (iii) inability to avoid significant environmental impacts." The following alternatives were considered, but were dismissed from further consideration as explained below.

5.3.1 No Pesticide Use Alternative

The Authority currently utilizes pesticides when chemical methods are necessary to meet a pest control objective. Under this alternative, the Authority would not use any pesticides to control pest populations in buildings and structures, recreational areas, agricultural lands, or natural lands. Instead, the Authority would only be permitted to implement manual and mechanical IPM activities to control pest populations. While this alternative would reduce potential environmental effects related to the use of pesticides (i.e., to special-status wildlife), it would also constrain the Authority's response to pest populations and would likely prevent the Authority from successfully eradicating pests from a number of preserves included in the IPM Program Area. As a result, pest populations in these areas would continue to expand, thus creating even greater demands to respond to pest populations. Under this alternative, the rate at which pest populations would be reduced would likely be substantially slowed because only manual and mechanical treatment options could be applied.

This alternative would likely require substantially greater staff and mechanical equipment (e.g., chainsaws, mowers,) to implement successfully and, therefore, impacts related to noise, air emissions, and GHG emissions from staff, contractor, and volunteer commute trips and equipment use would likely be greater compared to the proposed IPM Program. Further, it may be financially infeasible for the Authority to dedicate funding to provide the increased numbers of staff and contractors required to implement this alternative. In addition, the Authority would be limited in pest eradication options for buildings and structures (leading to their deterioration or demolition) and would likely need to alter most buildings and structures to prevent pest entry. This could lead to greater costs, from potential alterations or demolition, and to a potentially significant impact on historic resources if the structure or building is historic.

The No Pesticide Use alternative would substantially limit the Authority's ability to prevent the introduction of pest species in the IPM Program Area because of the slower response rates of manual and mechanical IPM activities. Thus, the Authority would not be as effective at reducing pest populations compared to the IPM Program and this would conflict with some of the objectives of the IPM Program. Overall, this alternative would reduce potential impacts related to the use of pesticides; however, it would likely result in greater environmental impacts related to noise, air quality, GHG emissions, and possibly historic resources, and it may be infeasible to implement. For these reasons, it was eliminated from further evaluation.

5.3.2 No Glyphosate Use Alternative

The Authority currently uses glyphosate-based herbicides when deemed appropriate to treat invasive vegetation. Given the increased public scrutiny over the use of glyphosate, the Authority considered removing glyphosate-based herbicides from the list of pesticides proposed for use in the IPM Program Area. However, the potentially significant biological resource impacts identified from the use of pesticides under the IPM Program (i.e., to special-status wildlife) are not specific only to glyphosate and would occur with use of many of the proposed chemicals, such as pyrethrin-based insecticides, and from spray applications of any of the proposed herbicides. Therefore, the removal of glyphosate-based products from the IPM Program would not avoid any significant environmental impacts and this alternative was eliminated from further evaluation.

5.4 ALTERNATIVES SELECTED FOR DETAILED ANALYSIS

Section 15126.6(e)(1) of the State CEQA Guidelines requires that the No Project Alternative be described and analyzed "to allow decision makers to compare the impacts of approving the project with the impacts of not approving the project." The no project analysis is required to discuss "the existing conditions at the time the notice of preparation is published…as well as what would be reasonably expected to occur in the foreseeable future if the project were not approved, based on current plans and consistent with available infrastructure and community services" (Section 15126.6[e][2]). This discussion compares the environmental effects of IPM activities that occur under existing conditions against the environmental effects which would occur if the IPM Program is approved and implemented.

Because the IPM Program is intended to comprehensively direct management of pests on Authority-owned open space preserves, the alternatives include variations in the IPM Program that would reduce certain environmental impacts. The alternatives are: a "Limited IPM Treatments on Natural Lands Alternative," and a "No Alterations to Buildings Alternative." These alternatives, as well as the No Project Alternative, are described below. Following each alternative description is a comparative evaluation of the environmental impacts associated with that alternative, in relation to implementation of the proposed IPM Program.

The following alternatives are evaluated in this PEIR.

- **Alternative 1: No Project Alternative** assumes the Authority would continue to implement manual, mechanical, and chemical treatments at the same rate and geographic coverage as occurs under existing conditions. Under the No Project Alternative, there would be no biological control treatments; there would be no increase in the rate or scale of IPM treatment activities; and there would be no increase in early detection/rapid response, mapping, and post treatment monitoring.
- **Alternative 2: Limited IPM Treatments on Natural Lands** would prohibit spraying of herbicides and invasive animal treatment activities, such as pond draining, egg addling, shooting, gigging, electroshocking, and trapping, on natural lands. Instead, only wicking and cut-stump application of herbicides would occur, and manual and mechanical treatments would be used to control invasive plants, including pulling, digging, scraping, cutting/mowing, weed whipping, brush cutting, girdling/frilling/drilling, and green flaming. IPM activities on recreational facilities, agricultural lands, and buildings and structures would be the same as those described under the IPM Program and would consist of manual, mechanical, and chemical treatments.
- **Alternative 3: No Alterations to Buildings** would prohibit all types of physical building and structure alterations to exclude pests, including building retrofits. The Authority would implement all other proposed IPM treatments for buildings and structures, including sanitation, pruning of vegetation, use of sticky or snap traps, habitat modifications, and pesticide use. IPM activities on recreational facilities, agricultural lands, and natural lands would be the same as those described under the IPM Program and would consist of manual, mechanical, and chemical treatments.

Further details on these alternatives, and an evaluation of the potential environmental effects of each relative to the proposed IPM Program, are provided below.

5.4.1 Alternative 1: No Project Alternative

The No Project Alternative assumes no approval of the IPM Manual and no implementation of the comprehensive IPM Program. The Authority would continue to implement manual, mechanical, and chemical IPM activities at the same rate and geographic extent as under existing conditions. While the Authority would continue to comply with existing regulatory requirements under the No Project Alternative, such as those related to the handling and use of pesticides, implementation of a comprehensive and consistent set of environmental protection measures (EPMs) and mitigation measures that are protective of the environment would not occur. In addition, under the No Project Alternative, there would be no formalized and coordinated adaptive management efforts, such as a ranking system for pest control projects, early detection and rapid response, and regional pest management research and monitoring, all of which would be reported and tracked through the annual IPM Program Report and Work Plan under the IPM Program.

AESTHETICS

Under the No Project Alternative, manual, mechanical, and chemical treatments would continue to occur across the Authority's preserves. The No Project Alternative includes the implementation of up to 20 simultaneous IPM treatment activities, each conducted by one to three Authority staff. Similar to the IPM Program, when large equipment is in use near public areas or in areas visible from nearby vistas, it would contrast with the natural aesthetic of the area and would temporarily degrade visual character and quality of views. In the long-term, IPM activities under the No Project Alternative may slightly alter the visual character of treatment sites by removing invasive plant species; however, the treated areas would remain in an undeveloped and natural state, thus views of the area would not change significantly and would likely improve with the re-establishment of native vegetation. With more IPM treatment activities occurring at any one time under the IPM Program, there could be a slight increase of equipment in use across the Authority's preserves that could be visible to the public; however, it would be similar to existing equipment and vehicles that are present throughout the IPM Program Area. In the long-term, with the increased pace and scale of IPM activities and early detection and rapid response proposed under the IPM Program, the visual character of the landscape in the IPM Program Area would likely return to native vegetative patterns with less nuisance plants and hazard trees more rapidly than under the No Project Alternative. Therefore, impacts to aesthetics associated with the No Project Alternative would be *Greater* than under the IPM Program.

BIOLOGICAL RESOURCES

Under the No Project Alternative, the Authority would continue to implement manual, mechanical, and chemical IPM activities at the same rate and geographic extent as under existing conditions. The Authority would continue to comply with existing regulatory requirements pertaining to biological resource protection. However, under this alternative, adherence to a comprehensive and consistent set of EPMs and mitigation measures that are protective of biological resources would not occur and some inconsistency in application of such measures could occur because of the lack of coordination of all pest management activities. Implementation of the IPM Program would incorporate several EPMs and mitigation measures to reduce impacts to sensitive biological resources, such as pretreatment surveys for and avoidance of certain special-status species, rare plants, and aquatic habitat, which would be incorporated into the mitigation monitoring and reporting program (MMRP) for the IPM Program to track and verify implementation of these measures. In addition, the IPM Program includes increased efforts in early detection and rapid response, monitoring treatment success, annual reporting of results, and adaptive management. Over time, these activities would likely improve the efficacy of the IPM Program and minimize the need for more potentially biologically harmful IPM treatment activities, such as the use of pesticides. Additionally, the increase of pest management activities under the IPM Program would result in a long-term benefit to special-status plant and wildlife species that occur in the IPM Program Area by removing invasive animals that may compete with special-status wildlife species and invasive plants that may reduce habitat suitability. The No Project Alternative would involve slightly fewer simultaneous IPM treatments because there would not be improvements in overall adaptive management, nor would there be a required set of EPMs or mitigation measures documented and tracked in the MMRP, and the long-term benefits to special-status species would occur at a slower rate. Therefore, impacts on biological resources would be *Greater* under the No Project Alternative than with the IPM Program.

HAZARDS AND HAZARDOUS MATERIALS

Under the No Project Alternative, the Authority would continue to implement manual, mechanical, and chemical IPM activities at the same rate and geographic extent as under existing conditions. Equipment and materials used for IPM activities (e.g., mowers, fuels, herbicides) would continue to be stored at the Authority's main office and two field offices located in the Rancho Canada del Oro Preserve and Sierra Vista Preserve. The Authority would continue to comply with existing regulatory requirements pertaining to hazardous material use, transport, and handling, including pesticides. However, under this alternative, adherence to a comprehensive and consistent set of EPMs that are aimed at minimizing potential impacts from hazardous materials as a result of pesticide and equipment use would not occur. Implementation of the IPM Program would incorporate several EPMs to reduce impacts related to the use of hazardous materials, such as inspecting equipment for leaks, specific safety measures for handling and applying pesticides, and notifying the public of pesticide use in public areas. These EPMs would be incorporated into the MMRP for the IPM Program to track and verify implementation. In addition, the IPM Program includes increased efforts in early detection and rapid response, monitoring treatment success, annual reporting of results, and adaptive management. Over time, these activities would likely improve the efficacy of the IPM Program and minimize the need for more potentially harmful IPM treatment activities, such as the use of pesticides. Although the No Project Alternative would involve slightly fewer simultaneous IPM treatments, because there would not be improvements in overall adaptive management, nor would there be a required set of EPMs documented and tracked in the MMRP, impacts related to hazardous materials and wastes would be *Greater* under the No Project Alternative than with the IPM Program.

HYDROLOGY AND WATER QUALITY

Under the No Project Alternative, the Authority would continue to implement manual, mechanical, and chemical IPM activities at the same rate and geographic extent as under existing conditions. The Authority would continue to comply with existing regulatory requirements pertaining to water quality protection. However, under this alternative, adherence to a comprehensive and consistent set of EPMs that are aimed at minimizing potential water quality impacts as a result of pesticide and equipment use would not occur. Implementation of the IPM Program would incorporate several EPMs to reduce potential water quality impacts related to the use of hazardous materials, such as inspecting equipment for leaks and specific measures for handling and applying pesticides, including prohibiting the use of herbicides within 50 feet of surface waters and when precipitation is imminent. These EPMs would be incorporated into the MMRP for the IPM Program to track and verify implementation. In addition, the IPM Program includes increased efforts in early detection and rapid response, monitoring treatment success, annual reporting of results, and adaptive management. Over time, these activities would likely improve the efficacy of the IPM Program and minimize the need for more harmful IPM treatment activities that can adversely affect water quality, such as the use of pesticides. Although the No Project Alternative would involve slightly fewer simultaneous IPM treatments, because there would not be improvements in overall adaptive management, nor would there be a required set of EPMs documented and tracked in the MMRP, impacts related to hydrology and water quality would be *Greater* under the No Project Alternative than with the IPM Program.

CULTURAL AND TRIBAL CULTURAL RESOURCES

The No Project Alternative includes the implementation of up to 20 simultaneous IPM treatment activities, which include ground disturbing activities such as digging, hoeing, discing, and cultivating. These types of ground disturbing activities have the potential to disturb cultural and tribal cultural resources, including buried archaeological artifacts and human remains. The Authority would continue to comply with existing regulatory requirements pertaining to cultural and tribal cultural resources, if encountered. The IPM Program includes the same activities that occur under the No Project Alternative; however, they would be expanded in scope and geographic extent. With an increase of IPM treatment projects occurring simultaneously under the IPM Program, there would be slightly more ground disturbing IPM activities occurring that have the potential to disturb cultural resources. However, implementation of the IPM Program would incorporate mitigation measures to reduce impacts to cultural and tribal cultural resources, such as surveying historic age buildings and structures before conducting any alterations, requiring that a qualified professional archeologist conduct pedestrian surveys for previously recorded archaeological resources before ground disturbing activities, and following professionally developed and accepted measures to avoid and minimize impacts to cultural resources if present in treatment areas. These mitigation measures would be incorporated into the MMRP for the IPM Program to track and verify implementation. Therefore, impacts to cultural and tribal cultural resources associated with the No Project Alternative would be *Greater* than under the IPM Program.

RECREATION

Under the No Project Alternative, the Authority would continue to implement manual, mechanical, and chemical IPM activities at the same rate and geographic extent as under existing conditions. Certain mechanical and chemical treatment activities result in temporary disruptions to recreational uses and access when conducted within or adjacent to publicly used areas of preserves. These disruptions primarily result from temporary closures during heavy equipment use or use of herbicides along public trails. The IPM Program includes the same activities that occur under the No Project Alternative; however, they would be expanded in scope and geographic extent. With an increase of IPM treatment projects occurring simultaneously under the IPM Program, there would be slightly more IPM activities occurring that could result in temporary closures of public areas. Therefore, impacts to recreational resources associated with the No Project Alternative would be *Less* than under the IPM Program.

WILDFIRE

Under the No Project Alternative, the Authority would continue to implement manual, mechanical, and chemical IPM activities at the same rate and geographic extent as under existing conditions, which requires the use of various types of equipment. Use of mechanical equipment, vehicles, and green flaming in vegetated areas has the potential to result in accidental wildfire due to sparks or other equipment malfunctions. In the long-term, if not well managed, invasive plants can present a fire risk by creating unnaturally high fuel levels. Invasive plant management conducted by the Authority under the No Project Alternative would continue to reduce fuel levels and associated wildfire risk. However, under the No Project Alternative, adherence to a consistent set of EPMs that are aimed at minimizing accidental wildfire ignitions as result of IPM treatment activities would not occur. Implementation of the IPM Program would incorporate EPMs to reduce the potential for accidental wildfire ignitions, including maintaining all diesel- and gasoline-powered equipment in good working condition, requiring all mechanized hand tools to have federal- or state-approved spark arrestors, and only permitting smoking in designated smoking areas with barren or cleared mineral soil to at least 3 feet in diameter. These EPMs would be incorporated into the MMRP for the IPM Program to track and verify implementation. Similar to the No Project Alternative, the IPM Program would not result in any new structures or populations that would be exposed to an increase in wildfire risk or post fire landslides/debris flow if they were to occur. In addition, the IPM Program would increase the pace and scale of invasive vegetation treatment, which would reduce fuel levels and associated fire risk more quickly. Although the No Project Alternative would use slightly less equipment and vehicles, because there would not be a required set of EPMs aimed at reducing wildfire risk documented and tracked in the MMRP, and the overall pace of invasive vegetation removal would be less, impacts related to wildfire would be *Greater* under the No Project Alternative than with the IPM Program.

5.4.2 Alternative 2: Limited IPM Treatments on Natural Lands

Alternative 2 would prohibit the use of spray herbicides and invasive animal treatment activities on natural lands. Specifically, no pond draining, exclusionary fencing, trapping, egg removal/addling, shooting, gigging, or electroshocking would occur to manage invasive animals. Instead, only invasive vegetation would be treated through wicking and cut-stump application of herbicides and manual and mechanical treatments, including pulling, digging, scraping, cutting/mowing, weed whipping, brush cutting, girdling/frilling/drilling, and green flaming. IPM activities on recreational facilities, agricultural lands, and buildings and structures would be the same as those described under the IPM Program and would consist of manual, mechanical, and chemical treatments, including invasive animal treatments. Invasive animal treatments would include exclusion, habitat modifications, trapping, and chemical use in buildings and structures and recreational facilities. Consistent with the IPM Program, adaptive management efforts, increased early detection and rapid response, and the incorporation of applicable EPMs would occur under Alternative 2.

AESTHETICS

Under Alternative 2, manual, mechanical, and chemical treatments would occur across the Authority's preserves; however, there would be no herbicide spraying or invasive animal control on natural lands. When large equipment is in use near publicly accessible areas of the preserves or in areas visible from surrounding vistas, it can contrast with the natural aesthetic of the area and temporarily degrade visual quality. Because Alternative 2 would involve fewer treatments on natural lands, temporary impacts related to equipment use would be slightly reduced. In the long-term, IPM activities under Alternative 2 and the IPM Program are expected to improve the visual character of treatment sites by removing invasive plant species and returning the landscape to more native vegetative patterns; however, these benefits would be reduced in natural areas without the application of herbicide sprays under Alternative 2. In addition, without invasive animal control under Alternative 2, invasive animal populations could increase and physically displace and consume native plants and wildlife that normally inhabit natural areas, or otherwise alter natural processes. Overtime, this would likely degrade the visual character and quality of natural lands. Because the presence of equipment and vehicles under the IPM Program would only be slightly increased relative to Alternative 2, and that in the long-term, the visual character of the landscape on natural lands would likely be improved with fewer invasive plants and animals present, impacts to aesthetics associated with Alternative 2 would be *Greater* than under the IPM Program.

BIOLOGICAL RESOURCES

Alternative 2 includes manual, mechanical, and chemical IPM treatments similar to the IPM Program; however, there would be no herbicide spraying or invasive animal control on natural lands. Consistent with the IPM Program, Alternative 2 would also require the implementation of EPMs and mitigation measures to minimize and avoid impacts to special-status species and wetlands and waters. Because spraying of herbicides could inadvertently affect special-status wildlife habitat, such as through damaging host plants for Bay checkerspot butterfly or entering waterways that are habitat for California coast steelhead; and can directly injure special-status wildlife individuals if present in treatment areas; Alternative 2 would result in fewer adverse impacts to special-status species and wetlands and waters. In addition, invasive animal control on natural lands, such as trapping, gigging, and pond training, have the potential to adversely affect special-status aquatic and terrestrial wildlife if present. Because no invasive animal control on natural lands would occur under Alternative 2, there would be fewer impacts to special-status wildlife. However, with no invasive animal control or spraying of herbicides to control invasive vegetation, the presence of invasive plants and animals could increase on natural lands, potentially resulting in long-term deterioration of habitat and loss of native species. Because direct and indirect impacts to special-status wildlife and wetlands and waters would be reduced under Alternative 2, impacts to biological resources associated with Alternative 2 would be *Less* than under the IPM Program.

HAZARDS AND HAZARDOUS MATERIALS

Alternative 2 includes manual, mechanical, and chemical IPM treatments similar to the IPM Program; however, there would be no herbicide spraying or invasive animal control on natural lands. Equipment and materials used for IPM activities, with the exception of equipment and material used for herbicide spraying and invasive animal control, would be stored at the Authority's field offices located in the Rancho Canada del Oro Open Space Preserve and Sierra Vista Preserve. Both Alternative 2 and the IPM Program would use and store equipment that require fuels, oils, and lubricants, which have the potential to be released into the environment if equipment is leaking or if an accidental spill occurs. In addition, the use of pesticides under Alternative 2 and the IPM Program can impact human health or the environment if improperly stored, handled, or applied. Consistent with the IPM Program, Alternative 2 would also require the implementation of EPMs to minimize the potential for impacts to human health and the environment from equipment and pesticide use. Although the IPM Program would minimize the potential for offsite, non-target impacts from spraying herbicides through EPMs regulating weather parameters under which herbicides could be used; Alternative 2 would result in fewer potential adverse impacts to the public and environment because herbicide spraying on natural lands would not occur. Therefore, impacts related to hazards and hazardous materials as a result of Alternative 2 would be *Less* than under the IPM Program.

HYDROLOGY AND WATER QUALITY

Alternative 2 includes manual, mechanical, and chemical IPM treatments similar to the IPM Program; however, there would be no herbicide spraying or invasive animal control on natural lands. Both Alternative 2 and the IPM Program would use equipment that require fuels, oils, and lubricants, which have the potential to be released into the environment and degrade surface water if equipment is leaking or if an accidental spill occurs. In addition, the use of pesticides under Alternative 2 and the IPM Program could result in water quality degradation if improperly stored, handled, or applied such that it travels offsite and into surface waters. Consistent with the IPM Program, Alternative 2 would also require the implementation of EPMs to minimize the potential for impacts to water quality from equipment and pesticide use. Although the IPM Program would minimize the potential for offsite, non-target impacts from spraying herbicides through EPMs regulating weather parameters under which herbicides could be used; Alternative 2 would result in fewer potential adverse impacts to water quality because herbicide spraying on natural lands would not occur. Therefore, impacts related to hydrology and water quality as a result of Alternative 2 would be *Less* than under the IPM Program.

CULTURAL AND TRIBAL CULTURAL RESOURCES

Although Alternative 2 would not spray herbicides or conduct invasive animal control on natural lands, Alternative 2 would include the same types and geographic extents of ground disturbing IPM treatments as the IPM Program, such as digging, hoeing, cultivating, and discing. Under Alternative 2, the same mitigation measures proposed under the IPM Program would be implemented to minimize and avoid impacts to cultural and tribal cultural resources, including surveying historic age buildings and structures before conducting any alterations, requiring that a qualified professional archeologist conduct pedestrian surveys for previously recorded archaeological resources before ground disturbing activities, and following professionally developed and accepted measures to avoid and minimize impacts to cultural and tribal cultural resources if present in treatment areas. Therefore, impacts to cultural and tribal cultural resources as a result of Alternative 2 would be *Similar* to the IPM Program.

RECREATION

Alternative 2 would implement the same IPM treatment activities as the IPM Program on recreational facilities, agricultural lands, and buildings and structures, but no spraying of herbicides or invasive animal control would occur on natural lands. Similar to the IPM Program, temporary closures of small areas of Authority preserves could occur under Alternative 2 during heavy equipment use or spraying of herbicides when conducted in publicly accessible areas. Given that Alternative 2 only restricts spraying of herbicides on natural lands, and includes the same IPM treatment activities as the IPM Program on recreational facilities, which are likely to be the areas that are open to the public, impacts to recreation as a result of Alternative 2 would be *Similar* to the IPM Program.

WILDFIRE

Alternative 2 includes manual, mechanical, and chemical IPM treatments similar to the IPM Program; however, there would be no herbicide spraying or invasive animal control on natural lands. Under Alternative 2, the same EPMs as proposed under the IPM Program would be implemented, which include measures to reduce the risk of accidental wildfire ignition from the use of equipment in vegetated areas, such as maintaining all equipment and requiring spark arrestors on mechanized hand tools. Because no ATVs or vehicles would be used to spray herbicides on natural lands, the risk of accidental wildfire ignition under Alternative 2 is slightly reduced relative to the IPM Program. However, without herbicide spraying on natural lands, invasive and potentially ignitable vegetation would not be removed as quickly or effectively as under the IPM Program. This could present an increased risk associated with wildfire ignition or wildfire spread within natural areas. Therefore, impacts related to wildfire as a result of Alternative 2 would be *Greater* than under the IPM Program.

5.4.3 Alternative 3: No Alterations to Buildings

Alternative 3 would prohibit physical building and structure alterations to exclude pests, such as covering openings with plywood or concrete, installing one-way hinged doors, or building retrofits. The Authority would implement all other IPM treatment activities proposed for use in buildings and structures under the IPM Program, including sanitation, pruning of vegetation, use of sticky or snap traps, habitat modifications, and the use of pesticides. In addition, IPM activities on recreational facilities, agricultural lands, and natural lands would be the same as those described under the IPM Program and would consist of manual, mechanical, and chemical treatments. Consistent with the IPM Program, adaptive management efforts, increased early detection and rapid response, and the incorporation of applicable EPMs would occur under Alternative 3.

AESTHETICS

Alternative 3 includes manual, mechanical, and chemical IPM treatments similar to the IPM Program; however, there would be no pest exclusion in buildings and structures that require physical building alterations. Alternative 3 would result in similar temporary impacts to visual quality from the use of equipment and vehicles in natural areas because IPM treatment activities on natural lands, recreational facilities, and agricultural lands would be the same as under the IPM Program. For this reason, long-term visual effects would also be similar, because invasive plants and animals would be treated and removed at the same rate as under the IPM Program. Building and structure alternations proposed under the IPM Program primarily include covering openings and installing one-way doors, and in some rare cases, building retrofits. Exclusionary building modifications would be small and would not significantly contrast with building materials such that they would be noticeable to viewers. Building retrofits, although rare, would be expected to slightly improve the condition of a building or structure and thus could slightly improve visual quality and character. Because visual changes that could occur as a result of IPM treatments on natural lands, recreational facilities, and agricultural lands under Alternative 3 would be consistent with those that would occur under the IPM Program, and that building alterations proposed under the IPM Program are not expected to significantly alter the visual landscape, impacts to aesthetics associated with Alternative 3 would be *Similar* to the IPM Program.

BIOLOGICAL RESOURCES

Alternative 3 includes manual, mechanical, and chemical IPM treatments similar to the IPM Program; however, there would be no pest exclusion in buildings and structures that require physical building alterations. Pest exclusion in buildings and structures proposed under the IPM Program has the potential to adversely affect special-status bat nursery roosts if implemented during the nursery season; however, this impact is reduced to a less than significant level with implementation of Mitigation Measure 3.3-2n (Avoid Loss of Special-Status Bat Roosts). Consistent with the IPM Program, Alternative 3 would also require the implementation of EPMs and mitigation measures to minimize and avoid impacts to special-status species and wetlands and waters. Because Alternative 3 would not install any exclusionary features to buildings and structures, the potential to impact special-status bat nursery roosts would be avoided. Because all other IPM treatment activities would be the same as the IPM Program, and all applicable EPMs and mitigation measures would be implemented, all other potential impacts to biological resources would be similar to those identified under the IPM Program. Therefore, because of the avoidance of affects to special-status bats, impacts to biological resources associated with Alternative 3 would be *Less* than under the IPM Program.

HAZARDS AND HAZARDOUS MATERIALS

Alternative 3 includes manual, mechanical, and chemical IPM treatments similar to the IPM Program; however, there would be no pest exclusion in buildings and structures that require physical building alterations. Because the same types of IPM treatments are proposed in all instances, except for building and structure alterations, potential impacts to human health or the environment related to the use of pesticides and mechanical equipment under Alternative 3 would be the same as under the IPM Program. Consistent with the IPM Program, Alternative 3 would also require the implementation of EPMs to minimize and avoid impacts to human health and the environment from the use of potentially hazardous materials. Building and structure alternations proposed under the IPM Program primarily include covering openings and installing one-way doors, and in some rare cases, building retrofits. These activities would not result in a substantial increase in the use of any potentially hazardous materials. Therefore, impacts related to hazardous materials and wastes under Alternative 3 would be *Similar* to the IPM Program.

HYDROLOGY AND WATER QUALITY

Alternative 3 includes manual, mechanical, and chemical IPM treatments similar to the IPM Program; however, there would be no pest exclusion in buildings and structures that require physical building alterations. Because the same types of IPM treatments are proposed in all instances, except for building and structure alterations, potential impacts to water quality related to the use of pesticides and mechanical equipment under Alternative 3 would be the same as under the IPM Program. Consistent with the IPM Program, Alternative 3 would also require the implementation of EPMs to minimize and avoid impacts to water quality from the use of potentially hazardous materials. Building and structure alternations proposed under the IPM Program primarily include covering openings and installing one-way doors, and in some rare cases, building retrofits. These activities would not result in a substantial increase in the use of any potentially hazardous materials or otherwise affect hydrology or water quality. Therefore, impacts related to hydrology and water quality under Alternative 3 would be *Similar* to the IPM Program.

CULTURAL AND TRIBAL CULTURAL RESOURCES

Alternative 3 includes manual, mechanical, and chemical IPM treatments similar to the IPM Program; however, there would be no pest exclusion in buildings and structures that require physical building alterations. Because the same types of ground disturbing IPM treatments are proposed under Alternative 3, potential impacts to archaeological resources, human remains, and tribal cultural resources under Alternative 3 would be the same as under the IPM Program. Consistent with the IPM Program, Alternative 3 would also require the implementation of mitigation measures to minimize and avoid impacts to cultural resources from ground disturbing IPM treatments. Buildings and structures within Authority preserves that are 50 years or older may be eligible for listing in the CRHR and therefore considered historically significant. Under the IPM Program, installation of building and structure exclusionary features have the potential to adversely affect historic resources. The Authority would implement Mitigation Measure 3.6-1, which requires that historic age buildings and structures be surveyed before alterations, and adhering to the Secretary of Interior’s Standards for the Treatment of Historic Properties, which would reduce impacts under the IPM Program to less than significant. However, because Alternative 3 would not alter any buildings or structures, impacts to cultural and tribal cultural resources as a result of Alternative 3 would be *Less* than under the IPM Program.

RECREATION

Alternative 3 includes manual, mechanical, and chemical IPM treatments similar to the IPM Program; however, there would be no pest exclusion in buildings and structures that require physical building alterations. Because the same types of recreation disturbing IPM treatments are proposed under Alternative 3, such as spraying of herbicides and use of large mechanical equipment near publicly accessible areas, potential impacts to recreation under Alternative 3 would be the same as under the IPM Program. Building alterations proposed under the IPM Program would not substantially affect recreation because closures of public areas would likely not occur as a result. Therefore, impacts to recreation under Alternative 3 would be *Similar* to the IPM Program.

WILDFIRE

Alternative 3 includes manual, mechanical, and chemical IPM treatments similar to the IPM Program; however, there would be no pest exclusion in buildings and structures that require physical building alterations. Alternative 3 would use the same types of mechanical equipment and vehicles at a similar rate across Authority preserves as the IPM Program, thus the potential for wildfire ignition would be similar. Consistent with the IPM Program, Alternative 3 would also require the implementation of EPMs to minimize the potential for wildfire ignition from IPM treatment activities. Building alterations proposed under the IPM Program would not result in significant wildfire related impacts because installing exclusionary features would use little to no mechanical equipment and building retrofits would be rare and likely improve the condition of buildings and structures. Therefore, impacts related to wildfire under Alternative 3 would be *Similar* to the IPM Program.

5.5 SUMMARY COMPARISON OF ALTERNATIVES

Table 5-1 summarizes the environmental analysis provided above for each of the alternatives relative to the IPM Program.

Table 5-1 Summary of Environmental Impacts of the Alternatives Relative to the Proposed IPM Program

Environmental Topic	Proposed IPM Program	Alternative 1: No Project Alternative	Alternative 2: Limited IPM Treatments on Natural Lands	Alternative 3: No Alterations to Buildings
Aesthetics	LTS	Greater	Greater	Similar
Biological Resources	LTSM	Greater	Less	Less
Hazards and Hazardous Materials	LTSM	Greater	Less	Similar
Hydrology and Water Quality	LTS	Greater	Less	Similar
Cultural and Tribal Cultural Resources	LTSM	Greater	Similar	Less
Recreation	LTS	Less	Similar	Similar
Wildfire	LTS	Greater	Greater	Similar

Notes: LTS = Less Than Significant Impact; LTSM = LTS with Mitigation; Less impact is less adverse than proposed IPM Program; Similar environmental impact is similar to proposed IPM Program; Greater impact is more adverse than proposed IPM Program.

Source: Compiled by Ascent Environmental in 2019 and 2021

Table 5-2 identifies which program objectives are met by the alternatives described above. As shown in Table 5-2, the No Project Alternative meets some of the program objectives; however, the proposed IPM Program goes further in meeting these objectives than the No Project Alternative. For instance, while the No Project Alternative would continue to inform the public about upcoming IPM activities and implement manual, mechanical, and chemical IPM treatments to inhibit the establishment of new invasive species on Authority preserves, it would not be as effective at controlling targeted pests nor would it result in the development of an adaptive management framework to promote the long-term effectiveness of pest management activities. The Limited IPM Treatments on Natural Lands Alternative (Alternative 2) and the No Alterations to Buildings Alternative (Alternative 3) at least partially meet all of the program objectives.

Table 5-2 Objectives Achieved by the Alternatives

Program Objectives	Objective Met with No Project Alternative?	Objective Met with Alternative 2?	Objective Met with Alternative 3?
Develop and implement site-specific pest management strategies that are effective in controlling targeted pests while avoiding damage to natural resources, promoting visitor safety and enjoyment, and protecting human health	Partially	Partially	Partially
Keep the interested public informed about treatment strategies, upcoming projects, and environmental and public health protection measures	Yes	Yes	Yes
Inhibit the establishment of new invasive species on Authority preserves	Yes	Partially	Partially
Maintain an inventory of invasive species infestations, monitor treatment effectiveness, and incorporate relevant monitoring results into future treatment applications	Partially	Yes	Yes
Implement an adaptive management framework to promote the long-term effectiveness of pest management activities;	No	Yes	Yes
Develop and implement an IPM Manual to standardize pest management and IPM procedures	No	Yes	Yes

Source: Compiled by Ascent Environmental in 2019 and 2021

5.6 ENVIRONMENTALLY SUPERIOR ALTERNATIVE

CEQA requires the identification of the environmentally superior alternative among the alternatives to the proposed IPM Program that were evaluated in detail, or, to identify if the proposed IPM Program is environmentally superior to the alternatives. The environmentally superior alternative must be an alternative that reduces some of the environmental impacts of the proposed IPM Program, regardless of the financial costs associated with the alternative, otherwise the proposed IPM Program could be determined to be environmentally superior. Identification of the environmentally superior alternative is an informational procedure. The alternative identified as the environmentally superior alternative may not be that which best meets the goals or needs of the proposed IPM Program. Determination of the environmentally superior alternative does not preclude the proposed IPM Program or the other alternatives from being selected for implementation.

The No Alterations to Buildings Alternative is the environmentally superior alternative because it eliminates potentially significant impacts to historic resources and special-status bats, while all other environmental impacts are similar to those expected under the IPM Program. However, this alternative does not meet all of the goals of the IPM Program. Specific to the buildings and structures management category, this alternative does not meet the objectives of implementing pest management strategies that are effective in controlling targeted pests and inhibiting the establishment of new invasive species. Without the installation of exclusionary features to buildings and structures, existing invasive species populations could increase, or new species could establish. Furthermore, exclusion is the only method that has been identified to control invasive bats in buildings and structures; therefore, the Authority would have no way to control or prevent the establishment of this target pest. The benefits of installing exclusionary features or conducting retrofits to effectively prevent and control invasive pests in buildings and structures may outweigh the potentially significant effects to historic resources and special-status bats, particularly because the IPM Program would implement mitigation measures whereby impacts to historic resources and special-status bats from building alterations would be reduced to less-than-significant levels.

The Limited IPM on Natural Lands has environmental advantages over the IPM Program as well. Since it would not spray herbicides or conduct invasive animal control on natural lands, potentially significant impacts to special-status wildlife would be reduced relative to the IPM Program. It would also reduce impacts related to water quality degradation from herbicide use under the IPM Program; however, this would not constitute a substantial reduction because the IPM Program would not result in significant impacts to water quality with the implementation of environmentally protective EPMs. However, these benefits come with greater impacts related to aesthetics and wildfire. Because invasive animals would remain that can negatively affect the condition of natural lands and habitats, the visual quality of natural lands would likely decrease over time. In addition, the rate of vegetation removal on natural lands would substantially decrease if only manual and mechanical treatment methods could occur, which would result in increased risks related to wildfire ignition and wildfire spread. This alternative also does not meet all of the goals of the IPM Program. Specific to the natural lands management category, this alternative does not meet the objectives of implementing pest management strategies that are effective in controlling targeted pests and inhibiting the establishment of new invasive species. Without the ability to use herbicides via spraying on natural lands, invasive vegetation would not be as effectively controlled, and target invasive animals would not be controlled at all under this alternative. Furthermore, the IPM Program is expected to result in greater long-term benefits to special-status species compared to the Limited IPM Alternative by removing invasive species that may compete with or reduce habitat suitability for special-status species at a greater pace and scale. The benefits of spraying herbicides and controlling invasive animals under the IPM Program may outweigh the potentially significant affect to special-status wildlife, particularly because several EPMs and mitigation measures would be implemented under the IPM Program that reduce this potentially significant impact to a less-than-significant level.

As shown in Table 5-1, the No Project Alternative (described above in Section 5.4.1) would result in greater environmental impacts than the IPM Program, primarily due to the lack of implementation of a consistent set of EPMs and mitigation measures aimed at avoiding and minimizing potential environmental impacts and reduced efforts in early detection and rapid response. In addition, with no comprehensive review and environmental coverage of an IPM Program, when the Authority proposes to implement IPM activities under the No Project Alternative, each proposal would need to be reviewed and evaluated on an individual basis to determine the appropriate course of action and level of environmental review. In cases where preparation of a CEQA document is determined to be required, there would likely be an overall delay in implementation of IPM activities to complete the process. Further, the Authority would likely be required to conduct multiple, repetitive environmental reviews on actions that are similar in nature. This would be less efficient, likely more costly, and longer process compared to the proposed IPM Program. It is likely that the overall treatment and success in pest eradication would be reduced relative to the IPM Program because of the potential need for individual evaluation (either by pest or by site), reduced geographic coverage and frequency of IPM treatments, and the lack of adaptive management techniques and thus would not meet many of the IPM Program objectives (refer to Table 5-2).

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Chapter 5 Alternatives

No references cited in this chapter.

Appendix A

Notice of Preparation and Public Scoping Comment Letters

SANTA CLARA VALLEY OPEN SPACE AUTHORITY

NOTICE OF PREPARATION OF A PROGRAM ENVIRONMENTAL IMPACT REPORT AND PUBLIC SCOPING MEETING FOR THE INTEGRATED PEST MANAGEMENT PROGRAM

Date: October 17, 2019

To: Responsible Agencies, Trustee Agencies, and Interested Persons

RE: Notice of Preparation of a Draft Program Environmental Impact Report for the Integrated Pest Management Program

The Santa Clara Valley Open Space Authority (Authority) proposes to implement an Integrated Pest Management (IPM) Program to comprehensively direct management of all pests on Authority open space preserves (preserves). The IPM Program is intended to formalize guidelines and procedures for the careful management of pests throughout the Authority's preserves while protecting natural resources and public health.

The Authority is in the process of preparing an IPM Guidance Manual (IPM Manual) to lay out the overall approach of the IPM Program. The IPM Manual will be an objective evaluation tool and process to effectively and efficiently make pest management decisions while providing for safe recreational use of the preserves and protecting their natural and cultural resources.

In accordance with the provisions of the California Environmental Quality Act (CEQA) (Public Resources Code [PRC] Section 21000 et seq.), the Authority has determined that the proposed IPM Program will require preparation of a Programmatic Environmental Impact Report (PEIR). The Authority will serve as the lead agency for CEQA compliance. The purpose of this Notice of Preparation (NOP) is to provide an opportunity for the public, interested parties, and public agencies to comment on the scope and proposed content of the PEIR. This NOP initiates the CEQA scoping process. A hard-copy of the NOP is available for public review at:

Santa Clara Valley Open Space Authority
33 Las Colinas Lane
San Jose, CA 95119

The NOP is also available for public review online at: **www.openspaceauthority.org/IPM**

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San Jose, CA 95119
408.224.7476 T
408.224.7548 F
openspaceauthority.org

PROVIDING COMMENTS ON THIS NOTICE OF PREPARATION

Agencies and interested parties may provide the Authority with written and/or email comments on topics to be addressed in the PEIR for the IPM Program. Because of time limits mandated by State law, comments must be received by **5:00 p.m.** on **November 18, 2019**. Please send all comments on the NOP by mail or email to:

> Santa Clara Valley Open Space Authority
> 33 Las Colinas Lane
> San Jose, CA 95119
>
> Attn: Galli Basson, Resource Management Specialist
> Phone: (408) 224-7476
> E-mail: gbasson@openspaceauthority.org

Comments provided by email should include "IPM Program NOP Scoping Comment" in the subject line, and the name and physical address of the commenter in the body of the email. If you are from an agency that will need to consider the PEIR when deciding whether to issue permits or other approvals for the project, please provide the name of a contact person.

All comments on environmental issues received during the public comment period will be considered and addressed in the Draft PEIR, which is anticipated to be available for public review in early 2020.

Focus of Input

The Authority relies on responsible and trustee agencies to provide information relevant to the analysis of resources falling within their jurisdiction. The Authority encourages input for the proposed PEIR, with a focus on the following topics:

- **Scope of Environmental Analysis.** Guidance on the scope of analysis for this PEIR, including identification of specific issues that will require closer study due to the location, scale, and character of the IPM Program;
- **Mitigation Measures.** Ideas for feasible mitigation, including mitigation that could potentially be imposed by the Authority and that would avoid, eliminate, or reduce potentially significant or significant impacts;
- **Alternatives.** Suggestions for alternatives to the IPM Program that could potentially reduce or avoid potentially significant or significant impacts; and
- **Interested Parties.** Identification of public agencies, public and private groups, and individuals that the Authority should notice regarding the IPM Program and the accompanying PEIR.

PUBLIC SCOPING MEETING

The Authority will conduct a public scoping meeting to inform interested parties about the project, and to provide agencies and the public with an opportunity to provide comments on the scope and content of the PEIR. The public scoping meeting is scheduled for the following time and location:

October 29, 2019; 6:00 p.m. to 8:00 p.m.; Presentation at 6:30 p.m.

Santa Clara Valley Open Space Authority Boardroom
33 Las Colinas Lane
San Jose, CA 95119

The meeting space is accessible to persons with disabilities. Individuals needing special assistive devices will be accommodated to the Authority's best ability. For more information, please contact Annelyse Dok at (408) 224-7476 at least 48 hours before the meeting.

PROGRAM LOCATION

The Authority has preserved over 25,000 acres of open space, natural areas, watersheds, and wildlife habitat in the cities of Campbell, Milpitas, Morgan Hill, San Jose, and Santa Clara and the unincorporated areas of Santa Clara County. The IPM Program Area includes the 14 open space preserves currently owned and managed by the Authority, totaling 16,197 acres across Santa Clara County (Figure 1), and excludes any publicly or privately-owned lands over which the Authority holds an easement. The preserves included in the IPM Program are described in Table 1.

Table 1 Authority Preserves Included in the IPM Program Area

Preserve Name	Acres	Public Access Status
Coyote Ridge	1,832	Closed
Coyote Valley	348	Open
Croy Redwoods	116	Closed
Diablo Foothills	834	Closed
El Toro Preserve	39	Closed
Mount Chual	626	Closed
Pajaro River Agricultural Preserve – South	183	Closed
Pajaro River Agricultural Preserve – North	101	Closed
Palassou Ridge	3,524	Closed
Rancho Canada del Oro	4,733	Open
Santa Teresa Ridge	53	Closed
Santa Teresa Foothills	9	Closed
Sierra Vista	1,556	Open
Upper Uvas	1,216	Closed
Little Uvas	276	Closed

Note: Pajaro River Agricultural Preserve South and North are considered one preserve.

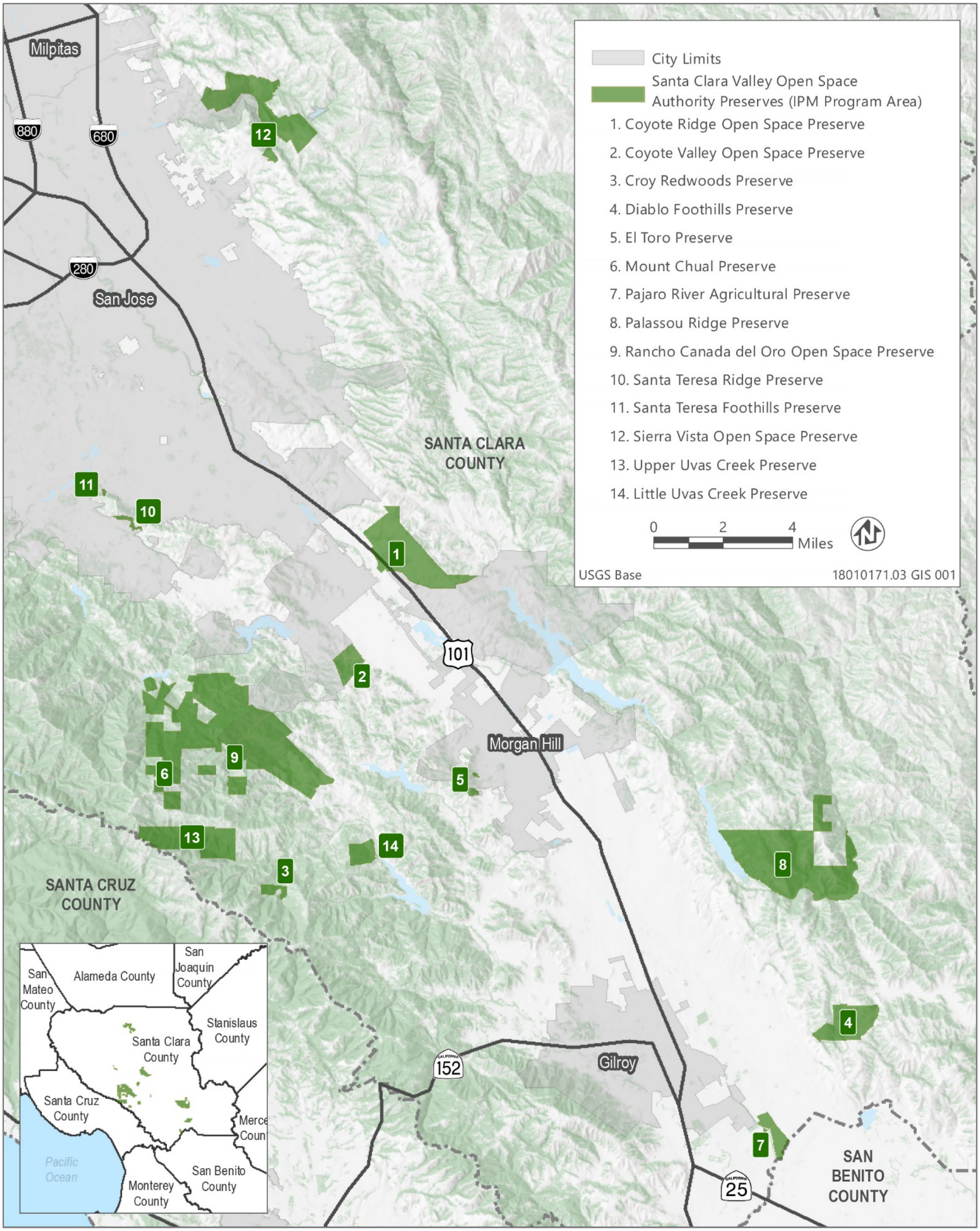

Figure 1 IPM Program Area

OPEN SPACE AUTHORITY
SANTA CLARA VALLEY

PROGRAM DESCRIPTION

The overall goal of the IPM Program is to effectively manage pests in the Authority's open space preserves and facilities, while protecting human health and environmental quality. Specific objectives of the proposed IPM Program include the following:

- Develop and implement site-specific pest management strategies that are effective in controlling targeted pests while avoiding damage to natural resources, promoting visitor safety and enjoyment, and protecting human health;
- Keep the interested public informed about treatment strategies, upcoming projects, and environmental and public health protection measures;
- Inhibit the establishment of new invasive species on Authority preserves, such as new invasive plants in natural areas, rangelands, and agricultural properties;
- Maintain an inventory of invasive species infestations, monitor treatment effectiveness, and incorporate relevant monitoring results into future treatment applications;
- Implement an adaptive management framework to promote the long-term effectiveness of pest management activities; and
- Develop and implement an IPM Program Guidance Manual (IPM Manual) to standardize pest management and IPM procedures.

To achieve these objectives, the Authority is preparing an IPM Manual to facilitate the design and implementation of pest management strategies that are effective in controlling target pests, cost-effective, safe for human health, and protective of natural resources, including native species, special-status species, and water quality. The IPM Manual is being developed based on review of existing scientific literature and plans documenting best approaches to effective pest management, as well as pest management approaches that have been successfully implemented by the Authority over the past several decades. The main components of the IPM Program are identifying the target species and understanding their life cycle, assessing distribution and abundance of pests, setting thresholds for targeted control, assessing site conditions to identify appropriate treatments, using the most benign suite of control methods to target the most vulnerable stage in a pest's life cycle, and preventing pest problems through early detection and rapid response programs.

Given the varied landscapes in which pests could occur, and that pest management techniques are rapidly evolving through scientific research and technical innovations, the IPM Manual outlines approaches for different IPM management categories, which include natural lands, agricultural lands, recreational facilities, and building and structures. A variety of methods can be used to manage pest plants and animals in these environments, including:

- manual treatments,
- mechanical treatments,
- biological treatments, and
- chemical treatments.

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To treat invasive plants, specific treatment methods include: pulling and digging by hand, cutting, mowing, weed whipping, tarping, mulching, release of a biological control agent (e.g., an insect) that targets an invasive plant species, and herbicide application. For management of animal pests, the following techniques are proposed: prevention and habitat modification, physical barriers and trapping, sanitation, and chemical control as a last resort (e.g., insecticidal soap, boric acid bait, diatomaceous earth, or rodenticide). The use of herbicides and rodenticides under the IPM Program would be regulated by the U.S. Environmental Protection Agency, the California Environmental Protection Agency, and the California Department of Pesticide Regulation.

POTENTIAL ENVIRONMENTAL EFFECTS

As required by CEQA, the PEIR will describe existing conditions and evaluate the potential environmental effects of the proposed IPM Program and a reasonable range of alternatives, including the no-project alternative. It will address direct, indirect, and cumulative effects. The PEIR will identify feasible mitigation measures, if available, to reduce potentially significant impacts. At this time, the Authority has identified a potential for environmental effects in the areas identified below:

- Biological Resources,
- Hazards and Hazardous Materials,
- Hydrology and Water Quality,
- Aesthetics, and
- Recreation.

The PEIR will evaluate all environmental topic areas included in State CEQA Guidelines, including the topics identified above. Feasible and practicable mitigation measures will be recommended to reduce any identified potentially significant and significant impacts.

ALTERNATIVES TO BE EVALUATED IN THE PEIR

In accordance with the State CEQA Guidelines (14 CCR Section 15126.6), the PEIR will describe a range of reasonable alternatives to the proposed IPM Program that are capable of meeting most of the objectives and would avoid or substantially lessen one or more significant effects of the IPM Program. The PEIR will also identify any alternatives that were considered but rejected by the lead agency as infeasible and briefly explain the reasons why. The PEIR will provide an analysis of the No Project Alternative and will also identify the environmentally superior alternative.

From: Galli Basson
To: Angie Xiong; Lily Bostrom
Cc: Jennifer Hooper; Derek Neumann
Subject: FW: follow-up on IPM NOP presentation
Date: Tuesday, November 5, 2019 10:51:53 AM

-----Original Message-----
From: D. Muirhead [redacted]
Sent: Thursday, October 31, 2019 10:15 AM
To: Galli Basson <gbasson@openspaceauthority.org>
Subject: follow-up on IPM NOP presentation

Hello Galli,
Thank you for the presentation and Q&A on Tuesday.
I had a chance to talk to you, Lea, Jennifer, and Derek.
Also Angie, whom I do not think I have met before and who is not in your on-line staff directory.

Should any of the following comments and questions rise to the level of actual "IPM Program NOP Scoping Comment"
then my contact information is
[redacted]
Email: [redacted]
Phone: [redacted]

Before attending your meeting I read your Draft Integrated Pest Management Plan Guidance Manual of July 2019 as well as Midpeninsula Regional Open Space District Integrated Pest Management Program Guidance Manual of September 2014 and the associated Addendum to the Environmental Impact Report for the Integrated Pest Management Program and Best Management Practices presented to their Board on February 27, 2019.

I also reviewed a presentation to the Water District Board in June 2016
Overview Of District's Pesticide Use As Part Of Integrated Approach
To Pest Management
This may at times result in misleading comparisons on my part.

You clarified that listing certain CEQA categories in the NOP does not imply that other categories will not be addressed.

You know that I like frameworks. You/Jennifer mentioned that you have a grazing plan, you are developing this IPM plan, and next is a fuels management plan (responding to my question about prescribed burns). Some day all of these will appear under an NRM umbrella?
Regards, DougM

Contents:
1) Permits
2) Scoping Cultural Resources
3) Disaster Response and Invasive Species
4) IPM Program Objectives
5) Inform the Public
6) Detection Methods and Timing
7) BMPs, Adaptation, and Skill Sets

8) Ground Squirrel Folklore
9) Tolerance Level and Feral Pigs
-----
1) The Water District Stream Maintenance Program requires many permits
from many regulatory agencies, places limits on what can be done and when,
and requires mitigation. The District does mention acquiring regulatory
permits from state and federal agencies that have legal jurisdiction
over application of pesticides.
In Guidance for Invasive Plants you say
Safe and effective use of herbicides requires adherence to a variety
of laws and regulations, as well as additional best management practices.
If impacts to federal or state-listed threatened or endangered species
cannot be avoided, the Authority should consult with the wildlife agencies
prior to project implementation.
? Question 1a: Are you not required to get any permits from regulatory
agencies?
? Question 1b: Do you really have no impact on Aquatic Resources (ponds
and streams)?
---
2) The NOP does not mention Cultural Resources.
? Question 2a: Might application of herbicides or pesticides on certain lands
be of concern to native tribes? I remember a mention of tribal interest
in part of the Coyote Valley preserve.
- Response 2a: Jennifer/Angie mentioned a state law (AB52?) and invitations
to local tribes to participate in the IPM process.

3) Disaster Response and Invasive Species ! Comment 3a: You may remember a presentation to your Board by Don Rocha
of County Parks on prescribed fire. He mentioned that one benefit of
working with CalFire on these burns was the opportunity to educate them
on personnel and equipment hygiene so that invasive species are not
imported or exported by disaster response.

4) In the NOP IPM Program Objectives you say
[I]mplementation of pest management strategies that are effective
in controlling target pests, cost-effective, safe for human health,
and protective of natural resources ... and water quality.
? Question 4a: Is use of herbicides to be minimal/eliminated
or environmentally desirable?
This comes from the Water District pesticide presentation which made
the following points for herbicide use:
a) reduce the frequency with which an area needs to be maintained
b) minimize physical impacts such as large labor crews or heavy equipment
c) have a significantly lower emission of greenhouse gases and air quality
issues
d) provide greater control at a significantly lower cost
FY 16 Estimated Program Cost Using Herbicides
$2,129,107 $1,003 per acre
FY 16 Projected Cost Using Alternative Methods
$5,874,279 $2,767 per acre
? Question 4b: You talk about choices being effective and efficient but
do not go into the cost/benefit trade-offs. For example, when is time more
valuable than dollars? Another consideration from Derek was that he would not
send people to work on a 40-degree slope.

5) Inform the Public about treatment strategies, upcoming projects, and
environmental and public health protection measures.

! Comment 5a: The Water District maintains records of neighbors with
specific needs relative to notification prior to treatment of an
adjacent area to ensure such needs are accommodated.

! Comment 5b: I would like some high-level visual aids on a web site.
One might be a GIS layer for each pest or treatment for each OSA location.
Another might be a pop-up with pests and treatments for each OSA location.
Color-coded of course. Then a user can drill down based on interest.

? Question 5c: Guidance says that all treatment work will be documented
in a database that captures the most relevant information.
Perhaps a field on how the pest was first detected?

6) Detection Methods and Timing

Guidance says that each site will be examined twice annually or as
resources allow. Annual reporting appears to be integrated in the
preparation of the yearly work plan.

? Question 6a: What is the impact if examinations are delayed due to
lack of staff or disaster response priority overrides?

? Question 6b: You mention plant identification cards carried in vehicles.
What about those plant identification apps that I have heard
are used for BioBlitz?

7) BMPs, Adaptation, and Skill Sets

! Comment 7a: Guidance says you have and will develop and revise BMPs.
Many agencies (SCVWD, MROSD, SCCPRK) have existing BMPs. Would you
not be better served by sharing BMP creation and revision work?
FYI The County has an ordinance to reduce or eliminate pesticide use,
which is coordinated by Naresh Duggal in the County Executive's Office
and has a Technical Advisory Group (IPM-TAG) composed of County land
and facility departments, a labor union rep, a public interest group rep,
and the Water District.

! Comment 7b: You say that guidance is not prescriptive and will be
adaptive. I have two concerns.

a) A long list of web sites and associations would be a challenge
to track by your staff and impossible for an outsider.

b) You have an expectation that staff will continually improve their
relevant knowledge. If OSA actually makes that possible, great.
Morgan Hill says that they have the same expectation of staff,
but I never see them at webinars nor hear that they have attended
free training (e.g., by MTC and FHWA).
Perhaps Lea would be open to a (written) report at Board meetings
or at the Administration & Budget Committee on who has attended
what training in the recent quarter?

8) Ground Squirrel Folklore

Your Guidance says that Ground Squirrels can become a pest when they
burrow under building foundations or undermine footpaths and roadways.

! Comment 8a: I said to Derek that you did not address danger from ground
squirrel burrows causing broken legs for cattle and horses. He responded
that you have talked to your ranchers and none have reported this as a
problem. And if it was a concern for horses, I am sure you would have
heard from Kitty.

9) Tolerance Level and Feral Pigs

Guidance says that second-level management of invasive animal populations
will be to a defined tolerance level.

! Comment 9a: In an NRM presentation to Parks Commission by Don Rocha,
he mentioned that pigs can be beneficial if they just pass through

because their hooves break up the ground but bad if they remain in an area. That is the only time I have ever heard of the "tolerance level" concept.

Commenter: Shani Kleinhaus

Summary of Public Scoping Comment Received by Phone

Date	Name	Comments
10-11-19	Shani Kleinhaus (phone call with Galli Basson)	• Concerns about RoundUp. Pesticides avoided if possible. • OK with hand-pulling • Important to look at timing of activities. For example, do not mow when ground birds are nesting. Best time to do veg mgt is before migration of birds and after nesting. Also better to do smaller patches and rotate, rather than huge areas all at once. • Doesn't want rodents targeted for things like causing holes around trails.

COMMENT CARD

OPEN SPACE AUTHORITY
SANTA CLARA VALLEY

Program Environmental Impact Report for the Integrated Pest Management Program

Public Scoping Period: October 17 to November 18, 2019

Thank you for your interest in the Program Environmental Impact Report (PEIR) for the Integrated Pest Management (IPM) Program. Please share your comments regarding the environmental issues that should be considered in the PEIR. It helps if you are specific. You can submit your comments in several ways: (1) write your comment below and leave this form with IPM PEIR representatives; (2) take a comment card home and mail it in later; or (3) email your comment to gbasson@openspaceauthority.org.

All comments must be received or postmarked by 5:00 PM on November 18, 2019.

Your Contact Information: Dan Chamberlin
1880 Blackford Ln San Jose CA 95125

Your Comments: From what I read, I 100.00 % agree with the IPM draft. Thank you for the time and effort put into this.

- over -

PLEASE FOLD ALONG THIS LINE FOR MAILING

Your Name:____________________

Address:____________________

Place Stamp Here

Santa Clara Valley Open Space Authority
ATTN: Galli Basson, IPM PEIR
33 Las Colinas Lane
San Jose, CA 95119

Appendix B

Integrated Pest Management
Guidance Manual

FINAL

Integrated Pest Management Guidance Manual

OPEN SPACE AUTHORITY
SANTA CLARA VALLEY

Integrated Pest Management Plan

Guidance Manual for the

Santa Clara Valley Open Space Authority

Santa Clara Valley Open Space Authority
33 Las Colinas Lane
San Jose, CA 95119
www.openspaceauthority

July 2021

OPEN SPACE AUTHORITY
SANTA CLARA VALLEY

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Acknowledgements

This document was prepared for the Open Space Authority with the assistance of Jodi McGraw Consulting. Galli Basson, Resource Management Specialist with the Authority, led development of the document. Dr. Jodi McGraw, Principal Ecologist with Jodi McGraw Consulting, aided development of Sections 1-3 and helped assemble the document.

The following Authority staff contributed to development of this guidance manual:

Matt Freeman, Assistant General Manager

Derek Neumann, Field Operations Manager

Marisa Mibach, Open Space Technician II

Megan Robinson, Supervising Open Space Technician

David Tharp, Equipment Mechanic Operator

Jennifer Hooper, Planning Technician

The Authority received feedback from members of its Board of Directors and Citizens' Advisory Committee. The following partners also provided input on the policy:

Don Rocha, Director, Santa Clara County Parks and Recreation Department

Coty Sifuentes-Winter, Senior Resource Management Specialist, Midpeninsula Regional Open Space District

Dr. Stuart Weiss, Chief Scientist, Creekside Center for Earth Observation

Christal Neiderer, Staff Biologist, Creekside Center for Earth Observation

Rick Austin, Vegetation Program Specialist, Santa Clara Valley Water District

Julie M. Evans, Vegetation Program Director, California Native Plant Society

With permission from the staff at the Midpeninsula Regional Open Space District, Sections 4-7 as well as the glossary draw heavily on content presented in their Integrated Pest Management Guidance Manual (May and Assoc. et al. 2014) and the Draft Environmental Impact Report for the Integrated Pest Management Program Guidance Manual (Ascent Environmental, Inc. 2014).

Glossary

This section provides operational definitions for some of the terms used in this plan.

Active management: Physical actions intended to manage natural resources or built facilities for a desired outcome. Active management may include physical control (hand, mechanical control), or chemical control of pests or manipulation of their habitats. For example, mowing yellow star-thistle to remove it from an infested rangeland would be considered active management. In contrast, ***passive management*** includes design and cultural practices intended to change human behavior or the physical environmental in a manner that discourages pests from occurring. For example, installing boot cleaning stations, or requiring ranchers to inspect feed for yellow star-thistle seeds would be considered passive management.

Allelopathy: The suppression of growth of one plant species by another because of the release of toxic substances. The effect of suppressing the growth around a plant resulting from the release of toxic substances.

Basal rosette: A cluster of leaves spreading outward from the base of a low-growing plant. In thistles, such as yellow star-thistle, a basal rosette forms just before the plant bolts (i.e., sends up a main stem on which flowers are produced). Often, the timing of pest control treatment of plants is recommended for the "basal rosette stage."

Bolt: Process by which a young plant sends up a main stem on which flowers are produced. The timing of pest control treatment of plants is often recommended for either just before or just after bolting.

Broadleaf: Plants possessing broad (as opposed to needlelike or grass-like) leaves. Most of the trees and shrubs on Authority preserves are broadleaves. Pest control treatments prescribe different treatments for broadleaf plants than for grasses, sedges, and needle-bearing trees such as pine trees.

Containment: A pest control strategy that focuses on establishing a pest-free area (e.g., a mowed or cleared area around a well-established population of invasive plants), and ensuring, through active management, that the target pest does not move past the defined area into the surrounding (pest free) areas. Containment is typically used when eradication of a target pest is no longer considered a viable option.

Control: A pest control strategy that focuses on reducing the number, amount, or extent of a pest over time to achieve a defined tolerance level. Control may result in full eradication of a pest, or reduction in the pest such that it no longer causes economic or environmental damage, or human health concerns.

Eradicate: A pest control strategy that focuses on eliminating all members of a target pest population.

Gigging: A pest control method typically used to kill bullfrogs, fish, and other aquatic pests whereby the animal is speared with a trident or spear while in water.

Herbicide: A pesticide (see definition below) intended for preventing, destroying, or controlling plant pests.

Herbivory: A type of predation typically used to describe the consuming of plants by animals. Herbivory has an impact on the health, structure, and diversity of natural plant communities. For example, low level herbivory can remove aging roots and leaves, allowing new growth of young roots and shoots resulting in healthy plant growth. At high levels, herbivory can damage plants, changing the composition, and reducing the quality of the natural plant community.

Homopteran Insect: A suborder of insects, including cicadas, aphids, and scale insects, having wings of a uniform texture held over the back at rest.

Hypercalcemia: An abnormally high level of calcium in the blood. In pest control, hypercalcemia is usually associated with rodenticide use.

Injurious: The term “injurious wildlife” refers to a defined list of species identified in either the federal Lacey Act (18 U.S.C. 42) or related implementing regulations (50 CFR 16). The U.S. Fish and Wildlife Service Office of Law Enforcement plays a role in preventing the introduction of invasive species into the U.S. through the enforcement of the Lacey Act which makes it illegal in the United States to import injurious wildlife, or transport such wildlife between states without a permit. Species are placed on the list when they are determined to be injurious to: human beings; the interests of agriculture, horticulture, forestry, or wildlife; or wildlife resources in the U.S.

Insecticide: A pesticide (see definition below) intended for preventing, destroying or controlling insect pests.

Insipient (invasive population): A population (usually referring to an invasive plant) that is small, but is beginning to reproduce and become established in a location or a region.

Metamorph (amphibian): A major change in the form or structure of some animals or insects that happens as the animal or insect becomes an adult. For amphibians, a metamorph refers to the stage of development between larval and adult. For example, the stage between a tadpole and adult frog. Some pest control techniques recommend treatment timing before or after the metamorph stage.

Multibenefited: actions that benefit multiple conservation values, such as biodiversity, water quality and supply, scenic resources, cultural resources, and working lands protection, among others.

Non-Native Species: An introduced, alien, exotic, non-indigenous, or non-native species. Includes species living outside their native distributional range, which have arrived there by human activity, either deliberate or accidental. Some introduced species are damaging to the ecosystem they are introduced into, others have no negative effect and can, in fact, be beneficial as an alternative to pesticides in agriculture for example. Refer to the definition of pest and invasive species (below) to differentiate non- native species that cause harm from other non-native species.

Noxious weeds: A plant species that has been designated by country, state, provincial, or national agricultural authority as one that is injurious to agricultural and/or horticultural crops, natural habitats and/or ecosystems, and/or humans or livestock. These weeds are typically agricultural pests, though many also have impacts on natural areas. Many noxious weeds have come to new regions and countries through contaminated shipments of feed and crop seeds or intentional introductions such as ornamental plants for horticultural use.

Pest Species: Insects, animals, or plant species that are incompatible with the Authority’s goal of protecting and restoring the natural environment, and with providing opportunities to enjoy and learn about the natural environment. Several categories of pest species are defined below:

- **Invasive species** are animal or plant species that invade and dominate sufficiently large areas, causing a reduction in biodiversity. They proliferate in the absence of natural control and interfere with the natural processes that would otherwise occur in natural areas. Once established, invasive species can become difficult to manage and can eliminate native species or otherwise alter the ecosystem. Invasive species are targeted in natural areas and rangelands. Invasive species can alter ecosystem processes by changing biotic ecosystem characteristics (such as plant community composition, structure, and interactions; trophic relationships; and genetic integrity) and abiotic characteristics and processes (such as fire regimes, erosion, sedimentation, hydrological regimes, nutrient, and mineral conditions, and light availability).

- **Structural and agricultural pests** include insect, plant, and animal pests that damage occupied buildings, formal landscapes, or agricultural crops, or pests that are a health threat to humans working in, living in, or visiting the buildings. Examples of structural pests include termites, ants, rodents, and stinging insects in buildings, and weeds in formal landscaped areas. Examples of agricultural pests include insects, weeds, and burrowing mammals such as moles and voles that damage crops. Structural and agricultural pests are targeted in buildings, recreational facilities, and agricultural properties.
- **Nuisance pest species** include species that commonly occur on Authority lands, such as stinging insects, but whose presence can be incompatible when their proximity or behavior conflict with human use of buildings and recreational facilities in the preserves. For example, hornets that locate their ground nests in trails must be removed if they are stinging hikers and horses using the trail. Branches and other types of vegetation must be trimmed back from trails, parking lots, picnic tables, and benches to allow safe visitor use. Similarly, vegetation must be cut back from the sides of roads to keep them open for patrol, maintenance, and emergency vehicles. Problem pest species are targeted in areas with focused visitor use.

Pesticide*:* A substance or mixture of substances intended for preventing, destroying or controlling any pest, including vectors of human or animal disease, unwanted species of plants or animals causing harm during or otherwise interfering with the production, processing, storage, transport or marketing of food, agricultural commodities, wood and wood products or animal feedstuffs, or substances which may be administered to animals for the control of insects, arachnids or other pests in or on their bodies. Pesticide is a broad term that encompasses:

- **Herbicides** (substances intended to control plant pests),
- **Insecticides** (substances intended to control insect pests),
- **Rodenticides** (substances intended to control rodent pests),
- **Other Substances,** such as **Fungicides** (substances intended to fungus pests) and **surfactants** (substances that adhere pesticides to surfaces such as plant leaves) and other substances often used with other pesticides to increase treatment results.

Pre-bait: A substance used to attract pests (e.g., rodents or other animals) to a feeding site as a preliminary step to use of a rodenticide or other pesticide to control the target pest.

Propagule: Any vegetative portions of a plant, such as a bud, stolon, root, tuber, rhizome, or other offshoot, that aids in the dispersal of the species and from which a new plant may grow. In pest control, follow-up treatments for invasive plants often focus on prevention and control of propagules after the initial mature plants are treated.

Rhizome: A modified subterranean stem of a plant that is usually found underground from which a new plant may grow. Plants often send out roots and shoots from these modified stems, resulting in vegetative (asexual) reproduction of a plant. In pest control, follow-up treatments for invasive plants often focus on prevention and control of rhizomes after the initial mature plants are treated.

Root Crown: The junction between the root and shoot portion of a plant. Crown sprouting is the ability of a plant to regenerate its shoot system after destruction of the above –ground portions of the plant. Crown sprouting plants typically have extensive root systems in which they store nutrients allowing them to survive after damage to the above-ground parts of the plant. In pest control, follow-up treatments for crown-sprouting plant species often focus on control of resprouting vegetation after the initial mature plants are treated.

Shooting: A plant that sends up shoots (new growth) from the underground portions of the plant. In pest control, recommended treatments are often timed for when invasive plants are actively 'shooting' or sending up new growth.

Seed Bank: In natural systems, the natural storage of seeds, often dormant, within the soil below the parent plant. In invasive plant control, treatment often focus on long-term management of plants that sprout from the seed bank, often years after the initial removal of mature invasive plants.

Taproot: A large, somewhat straight to tapering plant root that grows downward that forms a center from which other roots sprout laterally. The taproot system contrasts with fibrous root system, which typically have with many branched roots. Pest control of invasive plants often focuses on removal of the entire taproot to kill the target invasive plant.

Tolerance Levels: The level at which pests can be present without disturbing or disrupting natural processes, causing economic damage, degrading intended uses or human enjoyment of built facilities.

Acronyms and Abbreviations

Acronym or Abbreviation	Meaning
Authority	Santa Clara Valley Open Space Authority
BAOSC	Bay Area Open Space Council
BMPs	Best Management Practices
CAC	Citizens Advisory Committee
Cal-IPC	California Invasive Plant Council
CDC	Center for Disease Control and Prevention
CDFW	California Department of Fish and Wildlife (formerly Ca. Dept. of Fish and Game)
CDFA	California Department of Food and Agriculture
CDPR	California Department of Pesticide Regulation
CEQA	California Environmental Quality Act
CIPM	Center for Invasive Plant Management
CNDDB	California Natural Diversity Database
CNPS	California Native Plant Society
CRLF	California red-legged frog
CRPR	California Rare Plant Rank
CTS	California tiger salamander
DE	Diatomaceous Earth
ESRI	Environmental Systems Research Institute
FAQs	Frequently Asked Questions
IPM	Integrated Pest Management
MSDS	Material Safety Data Sheet
NISC	National Invasive Species Council
NRCS	National Resource Conservation Service
OMRI	Organic Materials Review Institute
OSP	Open Space Preserve
SCOSA	Santa Clara Valley Open Space Authority
SOD	Sudden Oak Death
TNC	The Nature Conservancy
UCANR	University of California Agriculture and Natural Resources
USDA	United States Department of Agriculture
USFWS	United States Fish and Wildlife Service
WM	Weed Manager
WMA	Weed Management Area
WUI	Wildland-Urban Interface

1 Introduction

This document was developed to guide efforts by the Santa Clara Valley Open Space Authority (Authority) to manage pests in its open space preserves and facilities following an integrated pest management approach, which is designed to protect human health and environmental quality.

1.1 Open Space Authority

The Authority is an independent special district established in 1993 to preserve key portions of the natural environment in order to balance continuing urban growth. Managed by an independent board of directors, the Authority's jurisdiction includes the Santa Clara County excluding the northwestern portion which is within the Midpeninsula Regional Open Space District, and the City of Gilroy.

The Authority protects key lands through acquisition of fee title and conservation easements, as well as contributing funds to joint conservation efforts. As of 2021, the Authority owns 14 open space preserves totaling 16,446 acres. (Figure 1). In addition, the Authority manages 1,464 acres of conservation lands that are owned by other government agencies or non-profit organizations.

On the Authority's open space preserves, the Authority implements resource management strategies that are designed to:

- Protect native habitats and species, which includes conserving rare, threatened and endangered species;
- Protect and restore water resources to benefit local communities and the environment;
- Reduce the risk of wildfire; and
- Provide opportunities for compatible, nature-based recreation and education

Mission

The Open Space Authority conserves the natural environment, supports agriculture and connects people to nature, by protecting open spaces, natural areas, and working farms and ranches for future generations.

Our Vision, Our Valley, Our Future

We envision the Santa Clara Valley and its surrounding hillsides as a beautiful place where a vibrant network of interconnected open spaces, trails, wildlife habitats and thriving agricultural lands enrich the region's cities, making our Valley an exceptional and healthy place to live, work, learn and play. In our vision of the Santa Clara Valley:

- A well-managed network of open spaces, farms and ranches sustains our natural heritage and provides resilience to a changing environment
- All members of our community are aware of the values of nature and have convenient access to local recreational and environmental education opportunities
- Our drinking water is safeguarded by protecting our local creeks and watersheds, from their headwaters in the surrounding hills to the Bay
- Community investment in nature -- and the essential benefits that nature provides -- sustains and enhances a healthy environment and economy
- The rich heritage of the Valley's agriculture is thriving, with locally grown foods contributing to healthy communities and creating a sense of place and pride in our region
- The Open Space Authority contributes to the region's quality of life by building and sustaining public and private partnerships in all our communities.

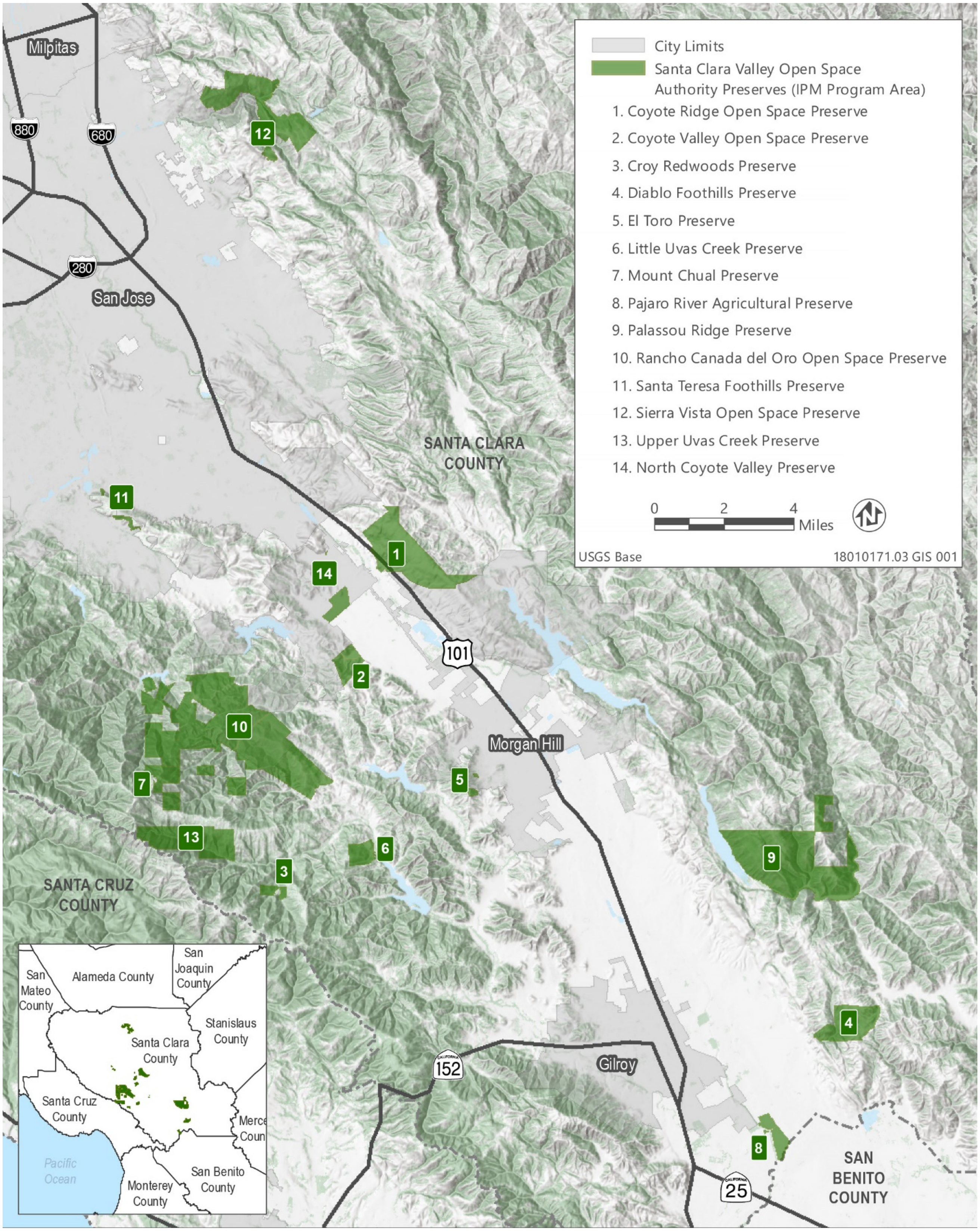

Figure 1: Santa Clara Valley Open Space Authority's Open Space Preserves

1.2 Pests

Though native plants and animals are critical components of the natural ecosystems that the Authority protects, certain species have negative impacts on natural lands. Most of these *pests* are *exotic species*, that are not native to the region and instead, were introduced deliberately or by accident through human activities.

As described in greater detail in Sections 3 through 7 of this manual, exotic plants, animals, and pathogens can negatively impact native species through a variety of mechanisms, alter natural ecosystem processes, create a fire hazard, and degrade recreational opportunities within the Authority's lands.

Additionally, some native plant and animal species are regarded as pests in certain circumstances; these include:

- rodents such as mice and rats, that colonize buildings;
- stinging insects such as wasps that establish around buildings and in picnic areas;
- plants with spines (e.g. spiny cocklebur) or oils that cause allergic reactions (e.g. poison oak) that occur along trail corridors and other areas of human activity; and
- plants that are poisonous to cattle (e.g. larkspurs) that occur in grasslands managed using conservation grazing.

These pests require carefully designed and implemented management strategies to conserve the open space values, while protecting human health and safety.

1.3 Pest Management Approaches

A variety of approaches can be used to manage pest plants and animals. Broadly speaking, these include:

- **Physical Control:** Manual or mechanical techniques, including cutting and pulling for plants, and trapping for animals, also includes use of a biological control agent, such as an insect or pathogen, to control exotic plant populations;
- **Chemical Control:** use of pesticides, which are chemical substances used to prevent, destroy, or control pests, such as herbicides for plants, insecticides for insects, and fungicides for fungal pathogens;
- **Cultural Control:** altering human activities, including cultivation, grazing, and prescription burning, to control plants, and techniques for managing waste, to discourage pest populations; and

Each of these general approaches features a variety of specific techniques, which vary in their effectiveness, efficiency, and risks, including potential impacts to human health. The costs and benefits of each often depend on the specific circumstances of the pest infestation, including the ecology and impacts of the pest species, its population size and distribution, and its location with respect to other conservation values (e.g. rare species) and human facilities and activities (e.g. structures and trails). As a result, it is not feasible to prescribe one treatment for each type of pest; instead, this manual outlines an approach to determining the appropriate treatment based on the relevant factors that influence its effectiveness, efficiency, and risks.

1.4 Integrated Pest Management

Integrated pest management (IPM) is a science-based, decision-making system used to design and control pest populations to limit their impacts as well as risks to people and the environment. The six main components of an IPM program are (May and Assoc. et al. 2014, UCANR 2016):

1. **Correctly identifying the species** and understanding its life cycle and ecology;
2. **Monitoring and assessing the pest's distribution and abundance** to gauge its impacts;
3. **Setting thresholds for targeted control,** designed to limit pest impacts while avoiding unnecessary and potentially costly treatment;
4. **Assessing site conditions to identify appropriate control treatments**;
5. **Using the least harmful suite of control methods,** by targeting the most vulnerable stage in its life cycle, and using biological, cultural, physical/mechanical and chemical management tools; and
6. **Preventing pest problems** through implementation of best management practices and early detection and rapid response program, among other prevention approaches.

The specific factors used to prescribe treatments, as well as the treatments themselves, vary depending on the type of pest and the environment in which it occurs.

1.5 Guidance Manual Objectives

This manual was developed to facilitate the design and implementation of pest management strategies that are effective, cost-effective, protect human health and safety, and safeguard natural resources including native species and water quality. It was developed pursuant to the Authority's IPM policy (Section 2, specifically IPM Policy 4 which calls for the Authority to "develop and implement a Guidance Manual to standardize pest management and IPM procedures." This manual reflects the Authority's mission (Section 1.1) and is consistent with other resource management policies, including the Conservation Grazing Policy (SCOSA 2012).

The IPM policy and manual are designed to inform the decision making process in the management of the Authority's open space preserves; the policy and manual do not apply to privately-held land over which the Authority holds conservation easements. In addition, the Authority's work to manage land held by other entities will follow the policies and plans of those entities.

This manual was developed based on review of existing scientific literature and plans documenting best approaches to effective pest management and draws heavily from the Midpeninsula Regional Open Space District's Integrated Pest Management Program Guidance Manual (May and Assoc. et al. 2014). It also integrates pest management approaches that have been successfully implemented by the Authority over the past several decades.

Because the approaches to controlling pest management differ depending on the type of pests and the environment in which they occur, the IPM approaches to pest management outlined in this manual are presented in five sections:

- Section 3: Management of Invasive Plants in Natural Lands;
- Section 4: Management of Invasive Animals in Natural Lands;
- Section 5: Management of Invasive Plants in Agricultural Lands;
- Section 6: Management of Pests in Structures; and
- Section 7: Management of Pests in Recreational Facilities

Rather than incorporating the wealth of information available about pest management techniques, which are rapidly involving through new scientific research and technical innovations, this manual focuses on outlining IPM approaches for each of the above situations. It incorporates by reference a series of resources, including organizations, websites, and books, which can provide information about pest management techniques (*Resources*).

This IPM approach incorporates an adaptive framework designed to achieve the Authority's land management goals over time (Section 1.1), by integrating newly developed scientific techniques and the lessons learned from monitoring treatments, to update the plan.

2 Integrated Pest Management Policy

The development of this guidance manual was informed by the Authority's IPM policy, which was developed with input from the Citizens' Advisory Committee (CAC) and partner agencies and organizations.

IPM Policy 1: Develop pest management strategies and priorities to:

1. Manage invasive species in natural areas and set priorities for their control to maximize the benefits for sensitive native communities and species and loss of biodiversity.
2. Manage pests on agricultural properties to support existing uses, while also protecting human health and surrounding natural resources.
3. Manage pests and potential human interactions in recreational facilities to minimize conflict, ensure visitor safety and enjoyment, and protect the surrounding natural resources.
4. Manage pests in buildings to support existing uses, while also protecting human health and surrounding natural resources.

IPM Policy 2: Take appropriate actions to prevent the establishment of new invasive species to Authority lands, especially new invasive plants in natural areas, rangelands, and agricultural properties.

1. Develop and implement best management practices to reduce the risk of invasion of exotic species into open space preserves, as part of steps to manage facilities, recreation, and vegetation, including through conservation grazing.
2. Implement an early detection rapid response program, which includes routinely inspecting areas that are most susceptible to invasion.
3. Focus on preservation of habitat with intact native vegetation and target populations of invasive species before they are widespread.
4. Stay abreast of regional invasive plant species issues and their management by coordinating with partners and neighboring landowners.
5. Promote visitor and staff education to prevent the spread of invasive species.

IPM Policy 3: Manage and monitor invasive species through an adaptive management framework that includes the following measures designed to promote long-term effectiveness, including:

1. Develop and maintain an inventory of invasive species on Authority lands.
2. Prioritize treatment of invasive species based on the benefits of treatment for sensitive species, as well as the risk posed by failure to control them, the ability of treatment to enhance other conservation values, including working lands, scenic values, and cultural resources, and their feasibility.
3. Prescribe site-specific strategies for control that provide the best combination of protecting Authority resources, human health, and non-target organisms that are efficient and cost effective in controlling the target species, and that reflect the species' biology and life-cycle.

4. Use the most appropriate method(s) to control invasive species including by integrating multiple management techniques such as grazing, manual removal, and mowing. Where pesticides are necessary, apply according to the label using all safety precautions and take all measures needed to protect the environment, health, and safety of visitors, employees, neighbors, and the surrounding natural areas including water and soil resources.
5. Monitor treatment effectiveness and adapt control techniques based on results as well as the latest research on invasive species ecology and management, and new methods and tools.
6. Plan for repeat treatments as needed based on species regenerative capabilities.
7. Coordinate and cooperate with adjacent landowners, neighbors, and other responsible agencies to control species regionally, wherever feasible.
8. Use prevention techniques such as early detection rapid response, training, use of volunteers, and BMPs.

IPM Policy 4: Develop and implement a Guidance Manual to standardize pest management and IPM procedures.

1. Evaluate the general types of pests and also individual species that will be subject to management, based on an assessment of their impacts on the ability of the Authority to achieve its mission;
2. Develop goals for management of types of pests, and criteria for assigning species or suites of species to the goals based on the costs and benefits of control;
3. Identify a suite of alternative management techniques that are cost-effective and safe;
4. Develop a framework for prioritizing management, given that resources are inherently limited; and
5. Identify best management practices to be implemented during pest management, to limit impacts to non-target species, other natural resources, and human health and safety, and facilitate environmental review of the IPM program (i.e. under CEQA).

3 Guidance for Invasive Plant Management in Natural Lands

Invasive plant species present a major challenge to the conservation values of the Authority's open space preserves. If not well managed, invasive plants can:

- Reduce native biodiversity, by displacing native plants and animals;
- disrupt natural ecosystem processes and the services they provide the community, such as by limiting stream flows and the public water supply;
- present a fire risk, by creating unnaturally high fuel levels;
- interfere with conservation grazing, by creating noxious forage for livestock; and
- degrade the cultural landscapes, recreational opportunities, and scenic resources, by altering the species composition of natural communities in the landscape.

Successful, long-term management of invasive plants requires careful planning to address the myriad factors that influence the effectiveness of invasive plant control treatments, limit their impacts on non-target species, restore native plants in treated areas, and prevent establishment of new occurrences. The widespread nature of invasive plants necessitates that work be prioritized to maximize effective use of available resources for management.

This section provides background information about exotic plant species in the Authority's open space preserves (Section 3.1), and then outlines the elements of a stepwise process for managing them (Section 3.2). The *Resources* section of this document provide more detailed information about management techniques, which are beyond the scope of this guidance manual, which is instead designed to provide the framework for planning and implementing invasive plant management.

3.1 Introduction

3.1.1 Exotic Plant Species

Authority lands support populations of plants that are not native to California that have been introduced from other regions of the world. Some introductions have been deliberate, as in the case of purple vetch (*Vicia benghalensis*) and Harding grass (*Phalaris aquatica*), which were seeded to enhance forage for deer and cattle. Most exotic species were introduced accidentally as part of other human activities, including livestock grazing and agriculture, with many arriving with the European settlers in the 17th century. A few species are ornamental plants, that were also deliberately planted. These species are relatively localized and typically have much lower impacts, due to their limited distribution and abundance.

Most of the exotic species in the open space preserves are ***naturalized***, meaning that they reproduce on their own in natural lands. Arguably the greatest richness (number of species) and abundance (e.g. density) of naturalized exotic plants occur in the preserve grasslands. Many of these species are native to European areas, where their adaptations to the Mediterranean climate including long summer drought and, in many cases, oligotrophic (low-nutrient) soils are said to have 'pre-adapted' them to California's grasslands. Fertilization of low nutrient soils, including serpentine soils, through nitrogen deposition has been found to promote growth of exotic plants, particularly European annual grasses, which then outcompete species adapted to growth on serpentine soils (Huenneke et al. 1990, Weiss 1999).

Historic land use including cultivation and livestock grazing may also have promoted the invasion and spread of these now ubiquitous species, which include grasses such as oats (*Avena* spp.), bromes (*Bromus* spp.), barleys (*Hordeum* spp.), and fescues (*Festuca* spp.); forbs including filarees (*Erodium* spp.); and clovers (*Trifolium* spp.).

3.1.2 Exotic Plant Impacts in Natural Lands

Exotic plants can negatively impact native plants and animals and alter natural systems through a variety of direct and indirect mechanisms (Table 1). Exotic plants can also alter culturally important landscapes, by altering the natural community structure and species composition, such as when French broom (*Genista monspessulana*) invades a native grassland. Exotic plants can degrade recreation opportunities, by constricting trail corridors and blocking scenic vistas.

3.1.3 Invasive Plant Species

Sixty-five (65) exotic species found in the Authority's open space preserves are regarded as *invasive* by the California Invasive Plant Council (Cal-IPC) (Cal-IPC 2019), because they aggressively spread, outcompete native plants, degrade habitat for native animals, and in some cases, can modify ecosystem processes such as hydrology, fire regimes, and soil chemistry (Table 2). These invasive plants have been categorized according to Cal-IPC standards based on their impacts as follows:

- **High**: Nine species (14%) have severe ecological impacts on physical processes, plant and animal communities, and vegetation structure. Their reproductive biology and other attributes are conducive to moderate to high rates of dispersal and establishment. Most are widely distributed ecologically.
- **Moderate:** Thirty-three species (52%) have substantial and apparent ecological impacts on physical processes, plant and animal communities, and vegetation structure, though not as severe as those that are rated in the high category. Their reproductive biology and other attributes are conducive to moderate to high rates of dispersal, though establishment is generally dependent upon ecological disturbance. Ecological amplitude and distribution may range from limited to widespread.
- **Limited**: Twenty-three species (34%) are invasive but their ecological impacts are minor on a statewide level or there was not enough information to justify a higher score. Their reproductive biology and other attributes result in low to moderate rates of dispersal. Ecological amplitude and distribution are generally limited, but these species may be locally persistent and problematic.

These ratings are based on expert interviews and scientific literature throughout California; impacts can differ depending on the conditions of the occurrence including the population density and the area in which it occurs, including sensitive habitat. Notably, the suite of invasive plants impacting serpentine grasslands includes species that are not typically considered highly invasive in more widespread ecological systems, including the California annual grasslands found on non-serpentine soils. Accordingly, the Authority classified invasive species according to priority for management within their lands. The list of species, including their Cal-IPC rating and Authority prioritization is found below (Table 2).

Table 1: Selected impacts of exotic plant species within the open space preserves

Impact	Description	Examples within the Authority's Open Space Preserves
Outcompete Native Plants	Invasive plants can deplete soil moisture and nutrients, shade-out native species, compete for limited space, and/or create conditions that deter native plant establishment, such as dense thatch.	Invasive herbs (grasses and forbs) in grasslands complete with native herbs and reduce native plant species richness and abundance.
Alter Community Structure	Invasive plants alter the structure of native communities, oftentimes degrading habitat for native animals.	Invasive annual grasses convert forb-dominated communities including the wildflower fields on serpentine soils, to grasslands, thus degrading habitat for the Bay checkerspot butterfly (*Euphydryas editha bayensis*). Invasive shrubs such as French broom convert grasslands to shrublands.
Alter Hydrology	Invasive plants can evapotranspire excessive amounts of water, thus reducing water flow or depth.	Giant reed (*Arundo donax*) in the Upper Pajaro River may reduce water flow and depth required by native species including California red-legged frog.
Alter Nutrient Availability	Exotic plants and organic matter to the soil over time, and, in the case of legumes can fix nitrogen; these inputs can ameliorate inimical soil conditions and promote further invasion by specie otherwise intolerant of the serpentine soil conditions.	Soils enriched with nitrogen by French broom can promote growth of invasive herbs following French broom control. Clovers (*Trifolium* spp.) can enrich serpentine soils.
Promote Fire in Non-Fire Adapted Systems	Invasive plants can create fuel conditions that promote fire, which can kill native woody species that are not adapted to fire. Fires that kill woody species can result in type-conversion of shrublands to grasslands as part of a grass-fire cycle (D'Antonio and Vitousek 1992)	Invasive grasses create fine fuels that promote fire in shrublands where widely spaced native shrubs and sparse herbs typically will not sustain fire. In non-fire adapted systems such as coastal scrub and chaparral, grass-fire cycles can convert shrublands to grasslands.
Impede Conservation Grazing	Exotic plants that are unpalatable or even noxious for cattle, can impede use of cattle grazing as a management tool to promote native plants, and maintain short-structure conditions in grasslands that are required by many native animals.	Dense patches of milk thistle (*Sylibum murinum*) and purple star-thistle (*Centaurea calcitrapa*) in the Coyote Ridge OSP can impeded effective cattle grazing of the serpentine grasslands, which is needed to reduce competition from dense exotic annual grasses on native annual forbs.

Table 2: Invasive plants known to occur within the Authority's open space preserves

Scientific Name[1]	Former Scientific Name[2]	Common Name(s)	Cal-IPC Rating[3]	Authority Priority	Life Form
Aegilops triuncialis		barbed goat grass	High	High	Annual grass
Ailanthus altissima		tree of heaven	Moderate	High	Tree
Avena barbata		slender wild oat	Moderate	Low	Annual, Perennial grass
Avena fatua		wild oat	Moderate	Low	Annual grass
Brachypodium distachyon		annual false-brome	Moderate	Moderate	Annual, Perennial grass
Brassica nigra		black mustard	Moderate	High	Annual herb
Brassica rapa		turnip, field mustard	Limited	Moderate	Annual herb
Brassica rapa var. *rapa*		field mustard; turnip	Limited	Moderate	Annual herb
Briza maxima		rattlesnake grass	Limited	Low	Annual grass
Bromus diandrus		ripgut grass	Moderate	Low	Annual grass
Bromus hordeaceus		soft chess	Limited	Low	Annual grass
Bromus madritensis ssp. rubens		red brome	High	Low	Annual grass
Carduus pycnocephalus		Italian thistle	Moderate	High	Annual herb
Carduus tenuiflorus		Italian thistle	Limited	Low	Annual herb
Carthamus lanatus		woolly distaff thistle	High	Moderate	Annual herb
Centaurea calcitrapa		purple star-thistle	Moderate	High	Annual, Perennial herb
Centaurea diffusa		diffuse knapweed	Moderate	Moderate	Perennial herb
Centaurea melitensis		tocalote	Moderate	Moderate	Annual herb
Centaurea solstitialis		yellow star-thistle	High	High	Annual herb
Centaurea stoebe ssp. *micranthos*	*Centaurea maculosa*	spotted knapweed	High	Low	Perennial herb
Cirsium vulgare		bull thistle	Moderate	High	Perennial herb
Conium maculatum		poison-hemlock	Moderate	High	Perennial herb
Cynara cardunculus		artichoke thistle	Moderate	High	Perennial herb
Cynodon dactylon		Bermuda grass	Moderate	Low	Perennial grass
Cynosurus echinatus		bristly dogtail grass	Moderate	Low	Annual grass
Cytisus scoparius		Scotch broom	High	High	Shrub
Dipsacus fullonum		wild teasel	Moderate	Low	Perennial herb

Table 2: Invasive plants known to occur within the Authority's open space preserves

Scientific Name[1]	Former Scientific Name[2]	Common Name(s)	Cal-IPC Rating[3]	Authority Priority	Life Form
Dittrichia graveolens		stinkwort; stinkweed	Moderate	High	Annual herb
Elymus caput-medusae	*Taeniatherum caput-medusae*	medusa head	High	High	Annual grass
Erigeron canadensis	*Conyza canadensis*	horseweed		Moderate	Annual herb
Erodium cicutarium		redstem filaree	Limited	Low	Annual herb
Eucalyptus globulus		blue gum	Limited	High	Tree
Festuca myuros	*Vulpia myuros var. hirsuta*	rattail sixweeks grass	Moderate	low	Annual grass
Festuca perennis	*Lolium multiflorum*	rye grass	Moderate	Low	Annual, Perennial grass
Foeniculum vulgare		fennel	Moderate	High	Perennial herb
Genista monspessulana		French broom	High	High	Shrub
Geranium dissectum		cutleaf geraniium	Limited	Low	Annual herb
Helminthotheca echioides	*Picris echioides*	bristly ox-tongue	Limited	Low	Annual, Perennial herb
Hirschfeldia incana		summer mustard	Moderate	High	Perennial herb
Hordeum marinum		Mediterranean barley	Moderate	Low	Annual grass
Hordeum murinum		wall barley	Moderate	Low	Annual grass
Hypochaeris glabra		smooth cat's-ear	Limited	Low	Annual herb
Hypochaeris radicata		rough cat's-ear	Moderate	Low	Perennial herb
Lepidium draba	*Cardaria draba*	heart-podded hoary cress	Moderate	High	Perennial herb
Marrubium vulgare		horehound	Limited	High	Perennial herb
Medicago polymorpha		California burclover	Limited	Low	Annual herb
Mentha pulegium		pennyroyal	Moderate	Moderate	Perennial herb
Nicotiana glauca		tree tobacco	Moderate	Low	Tree, Shrub
Oxalis pes-caprae		Bermuda buttercup	Moderate	Moderate	Perennial herb
Pennisetum clandestinum		kikuyugrass	Limited	Low	Perennial grass
Phalaris aquatica		harding grass	Moderate	High	Perennial grass
Plantago lanceolata		English plantain	Limited	Low	Perennial herb
Raphanus sativus		radish	Limited	Low	Annual, Biennial herb

Table 2: Invasive plants known to occur within the Authority's open space preserves

Scientific Name[1]	Former Scientific Name[2]	Common Name(s)	Cal-IPC Rating[3]	Authority Priority	Life Form
Rubus armeniacus	*Rubus discolor*	Himalayan blackberry	High	Moderate	Shrub
Rumex acetosella		sheep sorrel	Moderate	Low	Perennial herb
Rumex crispus		curly dock	Limited	Low	Perennial herb
Salsola australis	*Salsola tragus*	Russian thistle	Limited	Moderate	Annual herb
Salsola soda		glasswort	Moderate	Moderate	Annual herb
Salsola tragus		Russian thistle; tumbleweed	Limited	High	Annual herb
Senecio vulgaris		common groundsel		Moderate	Annual
Silybum marianum		milk thistle	Limited	High	Annual, Perennial herb
Stipa miliacea var. *miliacea*	*Piptatherum miliaceum*	smilo grass	Limited	Low	Perennial grass
Torilis arvensis		tall sock-destroyer	Moderate	Moderate	Annual herb
Tribulus terrestris		puncture vine	Limited	Moderate	Annual herb
Trifolium hirtum		rose clover	Limited	Low	Annual herb
Verbascum Thapsus		woolly mullein	Limited	Low	Perennial herb
Vinca major		greater periwinkle	Moderate	Moderate	Perennial herb

[1] Baldwin et al. 2012
[2] Hickman et al. 1993
[3] Cal-IPC 2019

3.1.4 Ongoing Invasions

Invasions of new exotic plant species will continue as humans continue to transport materials from around the world into the Bay Area, a global economic hub. Global climate change will also increase the rate of biological invasions by altering the suitability of habitats and promoting disturbance (e.g. floods and fires) which facilitate invasive plant establishment (Brook et al. 2008). Maintaining biodiversity in the Authority's open space preserves will require steps to prevent invasions (Section 3.2.1) and an adaptive approach to addressing invasive plant management as conditions change (Section 3.2.8).

3.2 Approaches to Managing Invasive Plants in Natural Lands

Management of invasive plants in natural lands is one of the primary strategies for biodiversity conservation in the open space preserves. It can also facilitate the Authority's work to protect and restore water resources, conserve working lands, and provide opportunities for nature-based recreation and education (SCOSA 2014a).

Invasive plant management is complex, can be resource-intensive, and, in many cases, requires a sustained effort to be effective; achieving the management goals will require careful, long-term planning and adaptation.

This section outlines approaches to managing invasive plants in natural lands. The approaches are presented as part of a step-wise process that is designed to achieve the goals, over time, as part of an adaptive management framework, as illustrated below (Table 3, Figure 2).

Rather than attempting to synthesize the wealth of technical resources available to aid successful planning and implementation of invasive plant management work, this document provides guidance for how to approach invasive plant management. The *Resources* section lists websites that provide information to plan, implement, and in some cases fund, invasive plant management, including many technical guides.

Figure 2: Adaptive management framework for invasive plant management in natural lands

Table 3: Summary of the step-wise approach to managing invasive plants in natural lands

Step and Section	Purpose	Key Elements
Prevent (Section 3.2.1)	Prevent the establishment of new invasive plant occurrences, to limit impacts and management costs	• Implement Best Management Practices to prevent accidental introductions during preserve management. • Coordinate with neighboring landowners to prevent spread of invasive plants from adjacent properties. • Engage the public to prevent them from vectoring invasive plant materials into the preserves. • Implement an early detection and rapid response program to detect and eradicate new invasive plant occurrences before they can spread.
Inventory (Section 3.2.2)	Identify invasive plants and map the most important occurrences to inform their management.	• Develop and update a list of invasive plants known or likely to occur in the open space preserves. • Identify species that are priorities for targeted control (i.e. species or guild-specific control, rather than general vegetation management such as conservation grazing). • Determine priority areas for mapping invasive plants, including areas that are more susceptible to invasion and sensitive to impacts of invasive plants. • Map invasive plants following protocols designed to obtain accurate, repeatable data (Table 6) that can be used to monitor changes over time, including to assess effectiveness of treatments as part of monitoring.
Set Goals (Section 3.2.3)	Determine the management goal for each occurrence	• Select the most appropriate goal for management of the occurrence based on its size, the ecology of the species, the conditions of the site in which it occurs, and the proven effectiveness of treatments.
Prioritize (Section 3.2.4)	Prioritize the invasive plant occurrences for management using criteria designed to maximize the sustainable benefit for the conservation values.	• Score each mapped invasive plant occurrence based on the following criteria designed to reflect their priority for management (Table 7): o Benefit of control for biodiversity conservation; o Potential for further impacts to biodiversity posed if management is not taken; o Additional benefits from control including engagement of public in volunteer stewardship, promoting agricultural, cultural, recreational and scenic resources; and o The relative ease and safety with which the goal can be achieved. • Categorize occurrences based on their score as follows: o High: will be treated wherever possible; o Medium: will be treated as resources allow, including in conjunction with high priority occurrences; o Low: will only be treated where doing so can extend benefits of treating high and medium priority occurrences, and when little effort is required.
Strategize and Treat (Section 3.2.5)	Develop comprehensive strategies that identify "who, what, when, where, why, and	• Devise strategies for each occurrence based on the invasive species' ecology, unique conditions of the occurrence including its density, and the system in which it occurs (Table 8). • Develop control techniques using an integrated pest management approach (Table 9) including appropriate use of herbicides (Appendix A) based on the best available information about what is effective, including

Table 3: Summary of the step-wise approach to managing invasive plants in natural lands

Step and Section	Purpose	Key Elements
	how" of each treatment	scientific reports (*References* and *Resources*), and results of monitoring of similar and/orprior projects. • Incorporate protection measures for sensitive biological resources (Table 12). • Document the treatment following methods that will enable evaluation of its effectiveness and overall level of effort on invasive plant management (Table 13).
Restore (Section 3.2.6)	Re-establish the natural community structure and species composition, to suppress invasive plants and promote native biodiversity.	• Assess whether active restoration techniques will be required because passive restoration will be insufficient to protect soil and water quality, and establish native plant cover to recreate natural communities. • Evaluate the advantages and disadvantages, as well as financial costs and benefits, of various restoration treatments for the site (Table 14). • Use weed-free materials and closely monitor restoration sites to detect and eradicate invasive plants introduced in off-site materials or by equipment.
Monitor (Section 3.2.7)	Monitor changes in the invasive plant occurrences and track invasive plant control work and evaluate its effectiveness over time.	• Conduct effectiveness monitoring in a subset of treatment areas, to evaluate treatment success and compare the effectiveness of alternative treatments at achieving the treatment goals. • Map new invasive plant occurrences encountered, as feasible, and update the invasive plant species inventory every five years, or as resources allow, to maintain a current database of invasive plant species occurrences to inform management.
Adapt (Section 3.2.8)	Adaptive invasive plant management over time to incorporate lessons learned and address changes in conditions.	• Develop annual work plans to adjust priorities based on changes in invasive plant species occurrences, and treatments based on new scientific information and results of prior monitoring. • Every five years, or as resources allow, revisit all elements of the program and make adjustments, where needed, to promote achievement of the overall goals.
Educate (Section 3.2.9)	Educate Authority staff and the public to promote effectiveness of the invasive plant management program.	• Work with staff to stay abreast of new invasive plant management information and techniques, through website and literature review, and participation in workshops, trainings, and conferences. • Increase public support of and assistance with the invasive plant management program, through information provided on websites, e-newsletters, kiosks, docent and volunteer programs, and interpretive signage.

3.2.1 Prevent

Preventing new exotic plant invasions will be the most cost-effective method of limiting impacts of exotic plants in the Authority’s open space preserves. Many invasive plants feature adaptations designed to promote their rapid spread, including well-dispersed and abundant seed. This can lead to exponential increases in their disturbance and abundance as well as their impacts to native plants and animals and the cost of their control. Detecting and eradicating invasive plants before they spread not only greatly reduces the cost of control but can also prevent their impacts on biodiversity and other conservation values.

To limit future invasions, the Authority will implement a suite of prevention strategies (inset box) to minimize the likelihood that new invasive plants will become established and eradicate new invasive plant occurrences before they can spread.

Prevention Strategies

Plan: Assess project areas and incorporate invasive plant prevention strategies for facilities development and maintenance, vegetation management, and other preserve activities that can promote invasive plants.

Avoid Moving Invasive Plant Materials: take steps to prevent workers, visitors, grazing animals, and equipment from vectoring invasive plants into preserves.

Reduce Vegetation and Soil Disturbance: Limit the extent of bare soil conditions that promote invasions and carefully monitor these areas.

Practice Early Detection and Rapid Response: Regularly monitor preserves, with an emphasis on new invasion pathways, to prevent establishment of new invasive plant occurrences.

Adapted from Cal-IPC 2012.

3.2.1.1 Best Management Practices

The Cal-IPC (Cal-IPC 2012) has assembled a comprehensive list of best management practices to prevent the spread of invasive plants during a variety of management activities conducted in natural lands, including:

- Construction and facilities maintenance;
- Vegetation management;
- Revegetation and landscaping;
- Fire and fuel management; and
- General operations including travel, waste disposal, and cleaning and maintenances of equipment and clothing.

This document will serve as a resource for the Authority when planning and implementing these and other types of projects and activities with the potential to promote the invasion and spread of exotic plants in natural lands. Specifically, during project planning, the measures will be reviewed and incorporated in related planning documents, including California Environmental Quality Act compliance documents, and contractor specifications. The BMPs will also be reviewed along with other invasive plant management topics during periodic trainings of Authority staff (Section 3.2.9).

The cost-effective implementation of these programs can be enhanced by identifying the most likely mechanisms of invasion (i.e. trails, roads) and the areas that are most susceptible to invasion. Table 4, below, lists common sources of invasive plants and identifies preventative measures and best practices that will be implemented, if feasible, to reduce the risk associated with each.

Table 4: Key strategies to prevent new exotic plant invasions

Category	Description	Best Management Practices
Facilities Construction and Maintenance	Minimizing the transport of seed and plant parts by vehicles and machinery into preserves.	• Locate facilities including parking, picnic, and staging areas on the perimeter of preserves. • Avoid importing materials including topsoil, fill, and gravel, and where necessary, use 'weed free' materials. • Avoid working in invasive plant infestations until after plants have been eliminated from the site. • Perform work that has the potential to transmit exotic plants, first in uninfested areas and then later in infested areas. • Wash all vehicles and equipment (e.g. mowers) to avoid transporting exotic plant seed or other propagules.
	Maintain native plant cover	• Limit road and trail grading to that which is necessary. • Avoid anthropogenic disturbances that create open conditions that are favored by invasive plants • Reseed with native plants using 'weed-free' seed sources following construction, intensive invasive plant abatement, or other disturbance.
Recreation	Minimizing the transport of seed and plant parts by recreators.	• Require or encourage equestrians to use weed-free hay. • Educate trail users about exotic plant invasions and encourage their help in identifying new invaders.
Conservation Crazing	Minimize soil disturbance	• Avoid extensive soil disturbance associated with intense cattle grazing; promote diffuse utilization by cattle. • Locate corrals on the perimeter of the preserve, in areas that can be frequently monitored and readily treated for invasions.
	Quarantine livestock	• When feasible, quarantine livestock in corrals or small pastures for at least 24 hours, to minimize transport of seed or other plant propagules into the remainder of the preserve.
	Manage supplemental feeding	• Limit supplemental feeding to designated areas on the perimeter of the preserve that can be closely monitored and readily treated for invasions. • Use only certified weed free hay.
Adjacent Properties and easements	Limit potential for spread from adjacent properties	• Limit disturbance along the perimeter of properties (e.g. avoid mowing and disking) • Work with neighbors to limit planting of invasive species in their landscaping and avoid disturbance along their property lines which can promote invasion into the preserves. • Work with easement holders and lessees to limit disturbance associated with maintaining and utilizing rights-of-way through preserves (e.g. utility corridors).

3.2.1.2 Coordinate with Other Landowners

The Authority will coordinate with others responsible for management of invasive plants on adjacent lands in the region to:

- share information about control techniques and their effectiveness;
- share information about invasive plant occurrences and treatment strategies near property boundaries; and
- stay abreast of emerging threats, including new invasive plants.

This coordination can occur through participation in meetings and other activities of the Santa Clara Weed Management Area, as well as through other opportunities to coordinate on natural resource management. Additionally, as resources allow, the Authority will partner with adjacent landowners and others to manage invasive plants across property boundaries.

3.2.1.3 Engage the Public in Preventing New Invasions

As part of the Authority's broader public and visitor education and outreach program, the Authority will enlist the assistance of open space preserve visitors and stewards, to help reduce plant invasions. Specifically, the Authority will encourage equestrians to use 'weed free feed'—hay and other materials that do not contain invasive plant species such as yellow starthistle, which can invade natural lands. Outreach materials will also encourage users to inspect and clean their vehicles, bicycles, boots, and clothing to avoid dispersing invasive plant seed and other materials into the open space preserves. The Authority will also incorporate invasive plant identification and management in its docent and volunteer training.

3.2.1.4 Early Detection/Rapid Response Program

Early detection and rapid response will enable the Authority to eradicate new exotic plant species that invade the open space preserves before they have a chance to spread and establish a seed bank, and before they cause significant impacts to the sensitive biological resources.

3.2.1.4.1 Detection Methods

Each open space preserve will be examined to detect occurrences of new exotic species twice annually, or as resources allow, once in the late spring and once in the mid-summer, to coincide with the two main flowering periods for annual species, to detect occurrences of new exotic species.

During each monitoring event, staff trained to identify invasive plant species, including any new invaders in the region, will inspect areas that are most susceptible to invasion, including:

- roads, trails, parking lots, staging areas, utility access areas (e.g. right-of-ways), building sites, and other areas accessed by vehicles, equipment, and livestock;
- areas of recent disturbance, including fire, vegetation management (e.g. fuel breaks), facilities maintenance or construction, or restoration; and

- areas of intense livestock use, including corrals, staging areas, water troughs, supplement feeding areas, ponds, and 'loafing areas' (e.g. ridgetops, swales, or under trees).

Heightened vigilance should be used during periods when invasions are more likely to occur, including:

- disturbances, such as fire, landslides, or other natural disturbances;
- facilities construction or maintenance, including road and trail work;
- resource management projects, including intensive invasive plant control and restoration projects;
- very wet years (e.g. El Niño years); and
- following application of soil amendment and fertilization, including application of herbicides.

Staff conducting the early detection surveys should have on-hand the following resources:

1. **Maps of Existing Invasive Plant Occurrences:** Hard copy or digital maps (e.g. spatial data layers) of existing invasive plant occurrences subject to species-specific control will be on hand, to provide the baseline for the search and prevent recordation or treatment of already identified occurrences that might not be priorities for treatment.
2. **Watch List**: A list of invasive plants that are subject to species-specific control within the open space preserves, as well as species on the Watch List available from Cal-IPC, which is updated twice each year (Cal-IPC 2016a).
3. **Species Identification Cards:** Effective identification can be aided through review of identification cards for target species known or likely to occur in proximity to the open space preserve system, including species on Cal-IPC's Watch List. Cards have been created previously by Authority staff and have also been created by Cal-IPC. The cards are laminated and put in a binder placed in all Authority vehicles. (Cal-IPC 2016b), and new cards can be added as needed.

To the extent practicable, all Authority staff and contractors working for the Authority will be trained to identify invasive plants, as feasible, to promote their detection during the course of routine preserve activities, including resource management, facility management, and interpretation. Authority docents and volunteers can also assist with this effort. This will enable staff and contractors to detect invasive plant occurrences during the course of their routine work in the preserves.

3.2.1.4.2 Assessment Methods

Each new occurrence should be assessed for the appropriate response. The assessment should include the following:

1. **Species identification:** particularly for new species, Authority staff should collect and key out species to ensure they are positively identified prior to treatment;
2. **Areal Extent:** the approximate area occupied by the occurrence (e.g. 1,000 square feet, or 20 feet by 5 feet)

3. **Cover:** the absolute canopy cover of the species within the area occupied (e.g. 40% cover);
4. **Life Stage**: the period in the plant's life cycle, such as seedling, juvenile, adult for perennial species;
5. **Phenology**: the stage in the plant's annual cycle of flowering and fruiting (e.g. in bud, in flower, in fruit, etc.)
6. **Site Factors Influencing Control:** An assessment of the factors that might influence control methods and effectiveness, including proximity to a road or trail, or location with respect to sensitive habitat of special-status species.

This information will be used to formulate a treatment plan or response.

3.2.1.4.3 Response

The goal of early detection and rapid response is to eradicate any new invasive plant species detected during the first year if feasible, with follow up treatments utilized to ensure the species has been eradicated. Staff conducting the surveys will have equipment on hand to treat any occurrences that can be positively identified and readily treated. This equipment will include hand tools (shovels, Pulaski, sheers, etc.) and heavy duty bags for disposal of propagules that can promote spread. Other species will be treated pursuant to the treatment plan developed based on the assessment above.

3.2.2 Inventory

An inventory of invasive plant occurrences within the open space preserves provides a solid foundation for the design and implementation of an effective invasive plant control program. Spatial data identifying the location, areal extent, and absolute cover of invasive plant occurrences is essential to setting goals for their eradication or control, prioritizing management based on their benefits, risks, and feasibility, and developing and implementing effective management strategies to achieve the goals, based on aspects of the occurrence and the site conditions. A spatial database for invasive plant occurrences also provides the baseline for monitoring effectiveness of the control efforts and informing modifications as part of an adaptive management strategy (Section 3.2.7).

This section outlines the recommended approaches to create and maintain a spatial database that provides the most essential information about species and communities that can be used to plan and monitor invasive plant management in the open space preserves. The inventory will be conducted through a three-step process:

1. Identify the invasive plant species that will be subject to targeted control;
2. Prioritize areas for mapping; and
3. Map target invasive species in areas based on their priority.

3.2.2.1 Identify Species for Targeted Control

Due to the large size of Authority's current preserve network, which features 14 properties totaling 16,197 acres, and its diverse ecosystems and prior land uses, it is not feasible to comprehensively inventory, much less successfully control, all occurrences of invasive plant species.

The Authority will use available information about invasive plant species, their impacts on biodiversity and other conservation values, and the effectiveness of various control techniques, to screen invasive plant species for *targeted control*. In targeted control, treatments are applied to individual species or guilds of species with similar ecologies (e.g. thistles or late-season annual forbs) to achieve specific management goals. General vegetation management techniques, such as conservation grazing and prescribed fire, can be used to control populations and reduce the impacts of invasive species that are not subject to targeted control, including many widespread invasive annual grasses such as ripgut brome (*Bromus diandrus*) and Italian rye grass (*Festuca perennis*).

The species selected for targeted control will be identified by:

1. Creating a list of known or likely invasive plant species within the open space preserves; and
2. Evaluating each species for targeted control based on a series of criteria based on their impacts and feasibility of targeted control.

3.2.2.1.1 Develop a Regional Invasive Species List

A list of species known or likely to occur in the open space preserves will be used to identify species for targeted control and inventory. The initial list developed for this manual was created by combining the following two databases:

1. **Cal-IPC Invasive Plants in Santa Clara County**: An annotated list of invasive plants that have been documented to occur in Santa Clara County was created by exporting the list of species from CalFlora, the online database of plant records in California (CalFlora 2016), and then annotating the species list with information from the Cal-IPC inventory (Cal-IPC 2019), including the life form (e.g. annual grass, perennial forb, shrub, etc.) and Cal-IPC invasiveness rating. The most widely accepted common names for species were also added from Jepson e-flora (2016), the online database of California flora.
2. **2019 Invasive Plants (SCOSA 2019a):** This spreadsheet listing the plants that the Authority currently targets for control was assembled by Authority staff based on their prior invasive plant mapping and management work and updated in 2019.

The combined list of invasive species known or suspected to occur in the Authority's preserves, as well as species that are in the region and may invade the preserve is included in a database (Excel workbook) that will be used to facilitate the early detection/rapid response efforts to prevent establishment of new invasive species (Section 3.2.1).

3.2.2.1.2 Select Species for Targeted Control

The regional invasive plant species list was independently reviewed by open space technicians involved in invasive plant work within the open space preserves as well as other Authority staff to identify and prioritize species for targeted control. These species were selected based on the following three main criteria:

1. Ecological impacts:
2. Invasive potential;

3. Feasibility of targeted control, based upon:
    i. Relative distribution and abundance with open space preserves;
    ii. Response to control treatments;
    iii. Occurrence on adjacent lands; and
    iv. Suitability of volunteer work for control.

The first two criteria were adapted based on the Cal-IPC state-wide assessment, to reflect unique circumstances in the region and in Authority preserves in particular, including the biological systems and species. The list includes 67 species, of which 21 (31%) are high priority, 16 (24%) are medium priority, and 30 (45%) are low priority species for targeted control (see Table 2, Section 3). The list includes six shrubs and trees, 29 biennial or perennial herbs (grasses and forbs), and 32 annual herbs (see Table 2, Section 3).

3.2.2.2 Prioritize Areas for Mapping

Due to the large size of the Authority's preserves, invasive plants targeted for control will need to be mapped over time. The sequence of mapping will reflect the priority for biodiversity conservation including the immediacy of management. This section outlines initial criteria that will be used to identify priority areas for mapping by developing and integrating spatial data layers that reflect the following:

1. Areas that are more susceptible to invasion; and
2. Areas more sensitive to invasive plant species impacts.

3.2.2.2.1 Identify Areas Susceptible to Invasion

Certain areas of the preserves are more susceptible to invasion than others owing to a variety of factors including:

- Prior and current land uses, particularly cultivation, grazing, and development of roads, trails, buildings, and other infrastructure, including utility corridors;
- Land use activities near the preserve, particularly those along the perimeter;
- History of fire or other disturbances including landslides;
- Areas where vegetation has been removed including as part of fuel breaks or restoration projects; and
- Communities that are more susceptible to invasion, including grasslands, savannas, wetlands, and riparian areas, as opposed to shrublands and dense woodland or forests.

These areas can be mapped and integrated into a GIS layer that identifies areas that are more susceptible to invasion. In addition to prioritizing areas to be mapped as part of the inventory, this layer can serve as a tool to facilitate efforts to detect and eradicate new invasive plant species (Section 3.2.1.2).

3.2.2.2.2 Identify Areas Sensitive to Invasive Plants

Invasive plants can more negatively impact biodiversity where sensitive biological systems are present. The following will be mapped in open space preserves, to further prioritize invasive plant mapping and treatment (Section 3.2.4).

1. Sensitive Communities: aquatic or terrestrial systems that meet one or more of the following criteria:
   - Listed as a 'special community' on the Department's current list of sensitive plant communities (CDFW 2010);
   - Ranked S1 or S2 on The Nature Conservancy Heritage Program; and/or
   - Identified as locally rare or unique, including disjunct occurrences or more widespread communities.

   Table 5, below, lists the sensitive communities identified within the Authority's Greenprint (SCOSA 2014a).

Table 5: Sensitive plant communities within the Authority's jurisdiction and open space preserves (BAOSC 2012, SCOSA 2019b, 2021)

Sensitive Communities	Acres within the Authority's Jurisdiction	Acres within the Authority's Open Space Preserves
Coastal Terrace Prairie Grassland	100	0
Coastal Scrub	3,371	186
Black Oak Forest / Woodland	46	0
Canyon Live Oak Forest	110	0
Valley Oak Forest / Woodland	2,284	38
Coulter Pine Forest	198	0
Knobcone Pine Forest	4	0
Sycamore Alluvial Woodland	6	0
Central Coast Riparian Forests	1,717	97
Serpentine Barren	40	0
Serpentine Grassland	11,618	1,532
Serpentine Scrub	1,054	46
Serpentine Leather-Oak Chaparral	1,560	30
Serpentine Hardwoods	6,036	395
Serpentine Conifer	55	0
Serpentine Riparian	75	13
Total	**28,274**	**2,337**

2. Special-Status Species Habitat: Areas that provide habitat for special-status species, including:

- **Federal Endangered Species Act**: listed or proposed for listing as threatened or endangered;
- **California Endangered Species Act**: listed or candidates for listing;
- **Fully Protected Species**: listed under California Fish and Game Code;
- **Species of Special Concern**: species of special concern on the special animals list (CDFW 2015);
- **Species of Conservation Concern**: species identified by the USFWS as being of conservation concern;
- **California Rare Plant Rank**: plants that are rare, threatened or endangered in California (CRPR Lists 1B and 2, CNPS 2016);
- **Western Bat Working Group**: species ranked as 'high' or 'medium' on the Regional Priority Matrix; and
- **CEQA**: other species that meet the definition of rare or endangered under CEQA, including those are not listed but known to be very rare or declining.

The locations of sensitive communities and special-status species occurrences or habitat will be integrated in a GIS layer that can be used to prioritize areas for inventory and invasive plant control. This composite layer can inform other aspects of the Authority's planning and management as well.

3.2.2.2.3 Integrate the Priority Areas

The spatial data layers illustrating areas that are more susceptible to invasion and those that are more sensitive to the impacts of invasive plants will be overlaid in GIS, to create a composite layer that identifies priority areas for mapping invasive plants as part of the inventory. Areas that are more sensitive and more susceptible should be mapped first, followed by areas that are only more susceptible and then areas that are only more sensitive; as resources allow, other areas should be subject to mapping.

3.2.2.3 Map Invasive Plants

Invasive plants will be mapped in areas of the preserves in order of their priority. Mapping will be conducted following a protocol designed to capture accurate, comparable, and repeatable data, so that occurrences can be remapped to evaluate changes and determine the need for adaptive management, using the most cost effective methods.

3.2.2.3.1 Mapping Goals

The goals of mapping invasive plant occurrences within the Authority preserves are:

1. Provide spatial information about the invasive plant occurrences that can help the Authority implement steps to control invasive plants, including set goals, prioritize species and areas for treatment, and develop strategies for treatments which can vary based on the site conditions;
2. Provide accurate locations for pre-emergent treatments;
3. Track changes in invasive plant occurrences over time;

4. Evaluate effectiveness of treatments at achieving the management goals; and
5. Tracking the level of effort for treating invasive plants over time.

To be effective overall, mapping should provide the greatest amount and most accurate and comparable information that can be obtained in the most cost-effective manner.

3.2.2.3.2 Mapping Software and Hardware

A variety of software and hardware options are available to map invasive plant species occurrences and their treatment over time. Historically, the Authority utilized resource grade global positioning systems to collect spatial data, which was then processed using ArcGIS geographic information system software (ESRI 2016). In 2015, the Authority began utilizing the Weed Manager system—an integrated system of multiple software components that enables organizations engaged in land management to map invasive plant species and monitoring their treatments over time (CalFlora Weed Manager 2016). The system includes Observer Pro, a mobile application that allows the Authority staff to map new invasive plant occurrences and update existing records in the field, using a global-positioning system-enabled tablet or smartphone that runs the application. The customizable software allows the Authority to identify the data fields to be collected based on the invasive plant management program. The subscription-based system is designed to evolve over time as subscribers provide feedback to enhance its utility.

In developing this manual, the Authority piloted work with Weed Manager and compared it to alternatives, including developing *de novo* databases to map weeds using resource-grade GPSs, and ArcGIS. The key advantages of using Weed Manager are:

1. The spatial is uploaded to the cloud (i.e. offsite server access via internet), where it is readily available for use by all users, such that the data do not need to be uploaded/transferred to multiple devices in order for the current open space technicians and other staff to have the information available for use;
2. New records can be readily related to prior records, allowing the Authority to track changes in invasive plant occurrences due to treatments or other factors; and
3. The tablet or smartphone hardware is more user-friendly as well as cost effective than resource-grade GPS, and the data acquired has sufficient accuracy for the purposes of the Authority.

Future invasive plant mapping systems may also be developed and will be evaluated for use in the future, as time allows.

3.2.2.3.3 Mapping Methods

In order for the spatial data to achieve the mapping goals (Section 3.2.2.1), including facilitate monitoring (Section 3.2.7), it should be collected following a protocol designed to obtain accurate, comprehensive, and repeatable information.

Invasive plant occurrences can be mapped as either points, lines, or polygons. Points located in the center of the patch are easier to collect but provide less information about the spatial distribution of the species than polygons, which delineate the patch boundaries. Polygons, on the other hand, can be time consuming to collect, particularly using mapping rules designed to make the data comparable.

The mapping rules that are most effective at providing the greatest amount and most accurate and comparable information in the most cost-effective manner to achieve the mapping goals (Section 3.2.2.3.1) will depend on a variety of factors including aspects of the: 1) invasive plant species, including its size, 2) the specific occurrence, including the shape, and 3) the landscape, including complexity of the vegetation and the terrain and other aspects that can influence feasibility of mapping. For these reasons, it is not feasible to come up with one set of mapping rules that present the best solution for all invasive species occurrences. At the same time, different mapping rules for the unique circumstances will reduce the comparability of the data and can present challenges to mapping implementation.

Recognizing these limitations and tradeoffs inherent in any mapping program, the following mapping rules are recommended to provide the greatest amount and most accurate and comparable information that can be obtained in the most cost-effective manner to achieve the mapping goals (Section 3.2.2.3.1). In general, new occurrences will be mapped as points for efficiency in the field and treated areas will be mapped as polygons to capture more accurate boundaries of occurrences. The following are intended to serve as guidelines for staff when mapping plant occurrences:

1. **Geometry for Mapping Occurrences:**
    a. If mapping points, record a point near the center (centroid) of patches.
    b. If mapping polygons, map the outer limits of patches that are 0.05 acres, or approximately 2,000 sf or greater;
    c. Use lines to map any long (>100 feet), narrow (<10 feet) patches that might be smaller than 0.05 acres, such as invasive plant occurrences along trails and roads;

2. **Defining Patches:** a patch should include one or more individuals of the same species that are within the following separation distances of each other:
    a. Herbaceous plants: 10 feet;
    b. Shrubs: 15 feet; and
    c. Trees: 30 feet.

    Plants that exceed this distance should be recorded in a new patch or as a point.
3. **Mapping Patches:** The perimeter of patches should be mapped using the method that provides the most accurate information in the most time-efficient manner. This may include:
    a. **Heads-up Digitizing**: drawing the polygon boundaries using diagnostic features observable in the aerial imagery, such as the signature of the vegetation, topography (e.g. ridgetop) as observed in a hillshade or topographic map layer, or other mapped features such as roads and trails; and
    b. **Walking the perimeter of the patch with the GPS**: the perimeter of the patch can be recorded as a continuous line (track) or by recording points at the vertices of the polygon.

3.2.2.3.4 Occurrence Documentation

Table 6, below, lists the information that should be recorded for each mapped occurrence (individual point or polygon) to inform its management and monitoring.

Table 6: Information to be collected for each mapped invasive plant occurrence.

Variable	Description	Coding
Unique ID	Unique identifier for the occurrence.	In Weed Manager, these are automatically assigned. For other systems, use the species six-letter code[1] followed by a sequential number from 1,000. For example, CENMEL083 is the 83rd mapped patch of *Centaurea melitensis*, or tocalote.
Observer	Full name of the person recording the occurrence	First name then last name
Date/Time	Date and time the occurrence was recorded	Recorded as follows to enable chronological sorting in the database: year-month-date hour: minute: second (e.g. 2016-03-24 08:30:15) This is automatic in Weed Manager
Scientific Name	Scientific name based on Jepson Manual 2 for the dominant plant	As in CalFlora, which follows the Jepson Manual 2 (Baldwin et al. 2012)
Common Name	Common name for the dominant plant	Name selected from the CalFlora Weed Manager application.
Additional Plants Present	Additional plants of interest that are interspersed with main occurrence	Common names
Preserve Name	Name of the preserve that the occurrence is on or near	Full name of the preserve without 'open space preserve'
Location Description	Brief narrative description of the location based on notable landmarks	Narrative text
Number of Plants	Estimated number of plants	Use the following categories: • 0 • 1 • 2-10 • 11-50 • 51-100 • 101-1,000 • 1,001-10,000 • >10,000
Percent Cover	Absolute cover of the area within the mapped patch, or for points, the area circumscribed based on the point diameter provided, that is comprised of the canopy of the species.	Visual estimate using the following categories: • 0-1 • >1-5 • >5-25 • >25-50 • >50-75 • >75-95 • >95-100
Distribution	General characterization of the invasive plant species distribution within the mapped area.	Use the following categories (Figure 3): • Single plant • Scattered plants • Single patch

Table 6: Information to be collected for each mapped invasive plant occurrence.

Variable	Description	Coding
		• Scattered dense patches • Dense monoculture
Notes	Any notes about the occurrences that can inform management	Narrative text
Dimensions	For points only, the dimensions of the patch which can be converted to area.	Near circles should be approximated using the radius; other patches should be approximated as rectangles (length x width).
Phenology		• Seedling/basal rosette • Bolting • Leafing out • Flowering • Fruiting • Mature • Vegetative • Dormant • Dead/Skeleton • Sapling
Photo	Two photos that are attached to the record	• First photo should be a close up of the plant. • Second photo is of the landscape which can help evaluate change over time and help others locate plant occurrence.

[1] Six letter species codes are created by combining the first three letters of the genus and the first three letter of the species. For infraspecific taxa, the six letter code is the first two letters of the genus, the first two letters of the species, and the first two letters of the variety or subspecies.

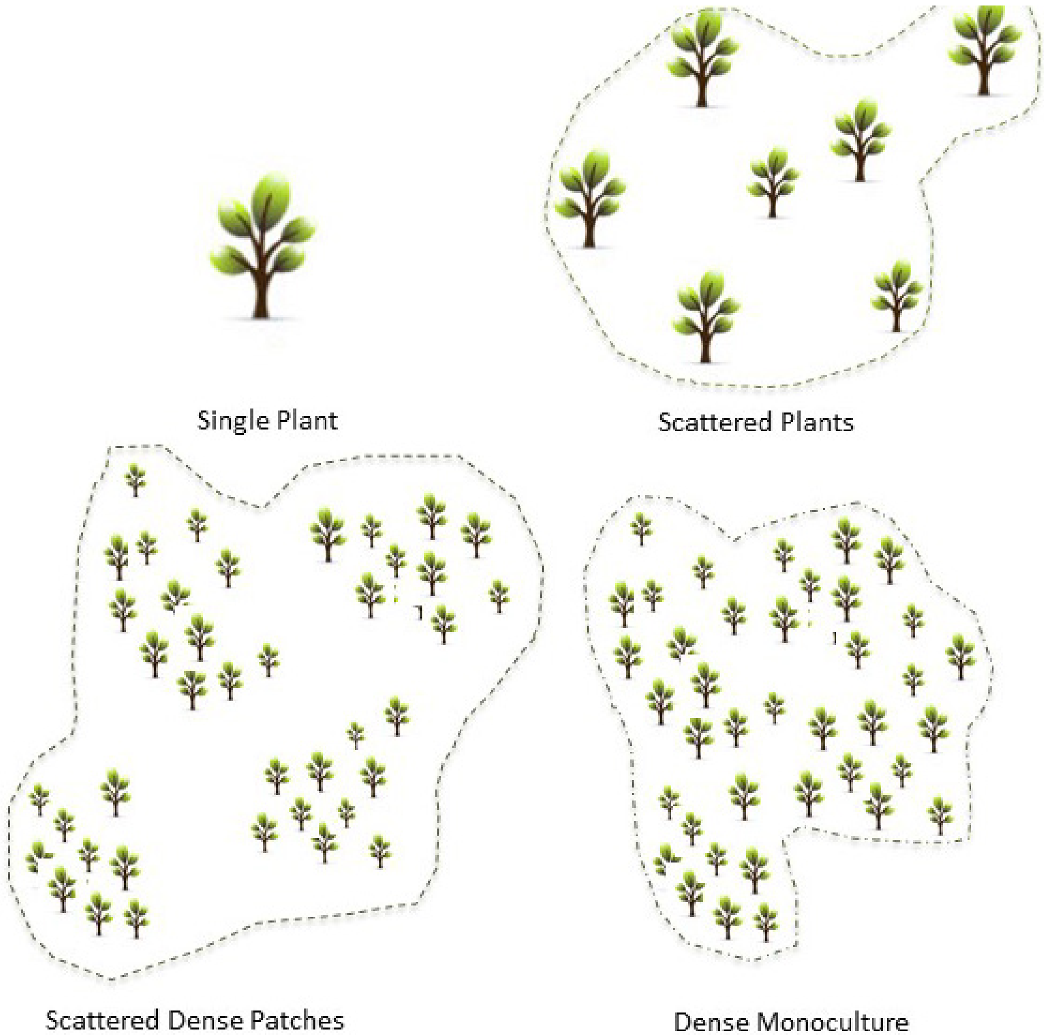

Figure 3: Plant distributions used to characterize occurrences during mapping

3.2.3 Set Management Goals

Each invasive plant occurrence, defined as a species occurring within a specific location in the Authority's open space preserves, will be assigned a goal for management. Illustrated in Figure 4, and listed in descending order of the thoroughness of the control effort or outcome, the goals are as follows:

1. **Eradicate:** Remove the invasive plant from the site, where it has a low likelihood of reinfestation;
2. **Eliminate:** Remove the invasive plant from the site, where it is reasonable to expect it will become reestablished in the next 20 years;
3. **Control Outliers:** Remove small or satellite populations of the invasive plant, where the larger core population will not be treated;

4. **Control Perimeter:** Remove small or satellite populations of the invasive plant in conjunction with treatment of the perimeter of its primary infestation; and
5. **Control Population:** Reduce invasive plant cover, seed set, or dispersal without the expectation that the species will be eliminated or eradicated.

These goals were developed based upon the system used by the Santa Cruz Unit State Parks (Hyland 2014). The types and definitions of the goals may be adjusted over time, as part of the adaptive management process, if additional or alternative management goals can promote the overall goals of the IPM program.

Each occurrence will be assigned the highest-level management goal that is appropriate and feasible, reflected in the numbers above (1-5 in which 1 is highest), , based on the ecology of the species, the site, and the effectiveness of treatments. Specific criteria that will be evaluated include:

- **The size of the occurrence,** in terms of areal extent and density of the population; all else being equal, smaller occurrences can be eradicated or eliminated more successfully than large and/or dense infestations;
- **The ecology of the species,** including its:
  - Fecundity: the number of seeds or other propagules that are produced;
  - Dispersability: the relative ability for seed or other propagules to be moved large distances;
  - Regenerative mechanisms: the means by which the plant can re-establish following removal, including from vegetation material left on site (e.g. stump sprouting, root sprouting, vegetative reproduction), and re-establishment from the *seed bank*, a dormant population of seed in the soil.
- **Aspects of the site in which it occurs**, including the:
  - Sensitivity of the site to impacts of the invasive plant, including presence of rare species or sensitive habitats, as well as other conservation values
  - Susceptibility of the site to ongoing invasion due to disturbance, proximity to roads or trails, or other factors increasing the *propagule pressure*; and
  - Competitiveness of co-occurring native plants, which will influence the effectiveness of native plant recolonization of the site following treatment; and
  - Proximity to property boundaries and natural topographic boundaries, including ridge lines (watershed boundaries).
- **Factors influencing effectiveness of the treatment**, including: the availability of effective manual, cultural, biological and/or chemical treatments for the species, and relative ease of working in the area based on site access, topography, and other factors.

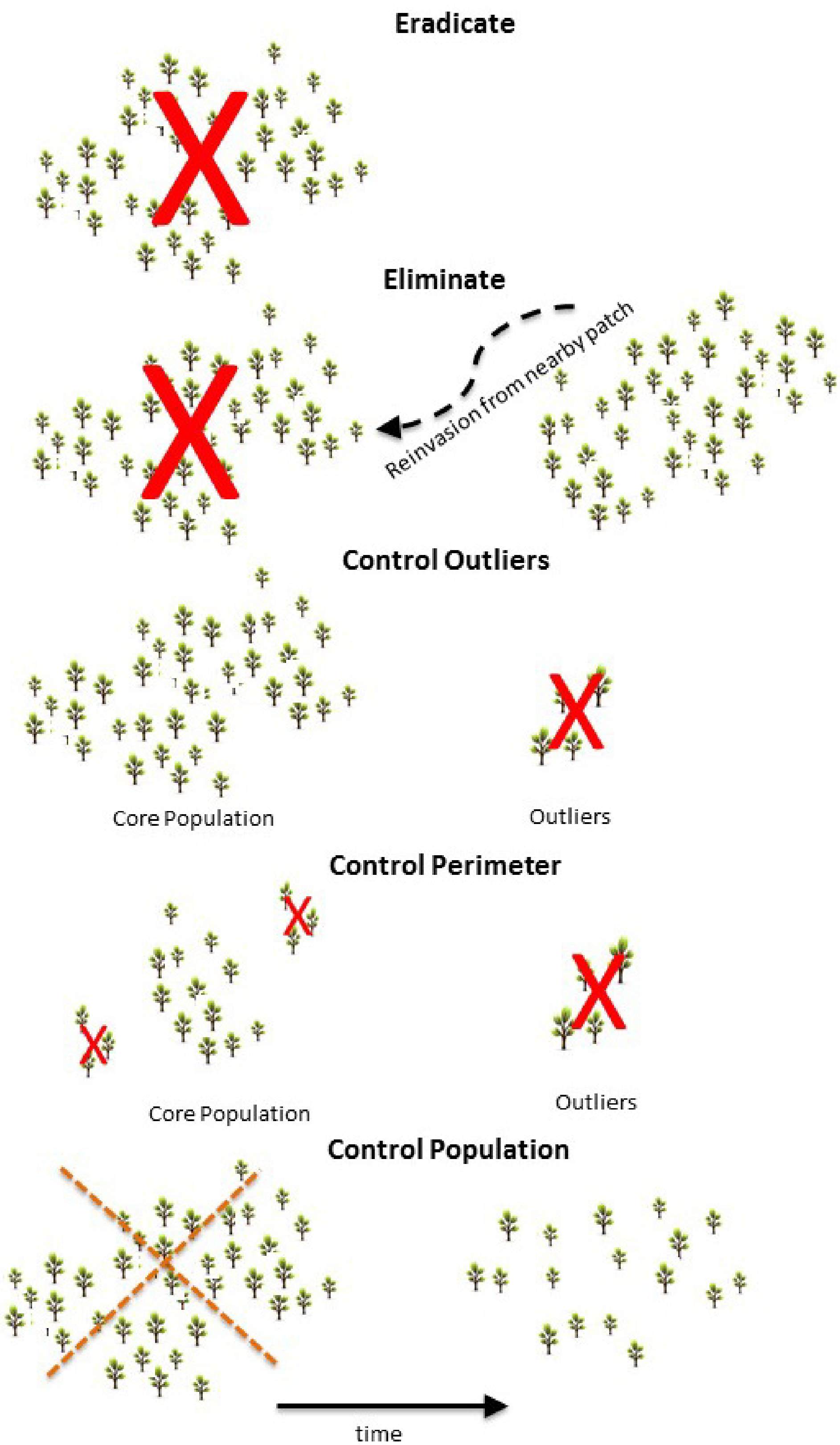

Figure 4: Illustration of the goals for invasive plant management in natural lands

3.2.4 Prioritize

Currently, the level of effort required to achieve the management goals for the invasive plants in the open space preserves outstrips the available resources, including primarily personnel time but also funding for direct costs including equipment and materials. Given the ongoing and potentially increasing rate of invasion, invasive plant management needs will likely always exceed available funding. As a result, it will be necessary to prioritize management to achieve the maximum, sustainable benefit for conservation values.

3.2.4.1 Assess Priority based on a Series of Criteria

Four main criteria will be used to prioritize invasive plant occurrences for treatment:

- **Benefit:** the enhancement to biodiversity that will result from treatment;
- **Risk:** the potential for further impacts to biodiversity posed if management action isn't taken (i.e. the opportunity cost of inaction);
- **Multibenefited:** control has additional benefits for the organization beyond simply protecting biodiversity, etc., including engaging the public through volunteer opportunities, improving relations with neighbors, promoting agriculture (grazing and row crop), and enhancing cultural, recreational, and scenic resources; and
- **Feasibility:** the relative ease and safety with which the goal could be achieved based on a variety of consideration including access, magnitude of effort required, and existence of a safe and effective treatment method.

The first three, Benefit, Risk, and Multibenefit, address what can be achieved through treatment. Feasibility assesses the constraints or the extent to which they are limited. Table 7, below, provides a concise definition of each criterion with an expanded list of considerations used to conduct the evaluation.

To determine overall priority, each criterion is scored on a scale of 1-5, in which 5 meets the criteria based on multiple considerations, 3= meets the criteria to a lesser degree/fewer of the considerations, 1=does not meet the criterion/reflects few or none of the considerations. Scores of 2 and 4 are assigned to intermediate levels. Explanations for each rating can be provided in a *Comments* field in the database, particularly where the rationale for the rating is not obvious. While assessing overall feasibility, potential volunteer exotic plant control projects can be flagged in the database using a separate *Volunteer* field.

The prioritization is conducted across all preserves, so that the management priorities reflect those of the entire preserve network, rather than within each specific preserve. The prioritization is implemented using GIS, which contains the mapped occurrence of each invasive plant, and additional spatial data layers used to inform scoring (inset box).

GIS Data to be Used for Invasive Plant Prioritization

Invasive plant occurrences

Plant community (vegetation) map, showing sensitive communities

Mapped occurrences of and habitat for sensitive species

Waterbodies (streams, ponds, lakes) which can influence use of certain herbicides

Roads, trails, and other access data

Slopes, which can influence access

Fire susceptibility and wildland urban interface boundaries

Pastures

Table 7: Criteria used to prioritize target invasive plant species occurrences for treatment. Each criterion is scored on a scale of 1-5, in which 5 meets the criteria based on multiple considerations, 3= meets the criteria to a lesser degree/fewer of the considerations, 1=does not meet the criterion/reflects few or none of the considerations. Scores of 2 and 4 are assigned to intermediate levels.

Criteria	Definition	Considerations

Benefit
 	
1= Less Benefit
5 = More Benefit
	If successful, the treatment will promote rare species populations, enhance diversity in special communities, restore natural community structure, and/or promote natural ecosystem processes.	• The treatment will maintain or promote rare species populations, by removing plants that:
		  ○ compete with rare native plants, and/or
		  ○ degrade habitat for a rare native animal.
		• The treatment will promote native species diversity in a special community (e.g. serpentine grassland, freshwater wetland, etc.).
		• The treatment will maintain or restore natural community structure, such by
		  ○ Removing trees from shrublands or herb-dominated communities;
		  ○ Removing shrubs from herb-dominated communities;
		  ○ Removing tall or dense herbs from short or sparse herb-dominated communities.
		• The treatment will promote natural ecosystem processes, including by eliminating species that affect:
		  ○ nutrient cycling, as in the case of nitrogen fixers;
		  ○ hydrologic conditions, such as by reducing water levels in wetlands, ponds or streams, or soils where moisture is limiting to native plant growth, or
		  ○ fire cycles, by creating dense and/or highly flammable fuels.
		• The treatment will promote effectiveness of other management for biodiversity, including:
		  ○ conservation grazing, by eliminating species that are noxious to cattle or other grazers, maintain or increase effectiveness of conservation grazing program; and
		  ○ fire management designed to prevent a risk of catastrophic wildfire that would negatively impact biodiversity.

Risk **1 = Less Risk** **5 = More Risk**	If successful, the treatment will significantly reduce future impacts to biological systems that will likely result from the future invasion and spread of the species	• The species is highly invasive, and will likely significantly increase its distribution and abundance in the absence of treatment. • The species has large impacts in the systems within or near the preserve, through competition and/or alterations to natural communities and ecosystem processes. • Delaying treatment will likely substantially increase the cost of future treatment. • Species is in a heavily traveled route where it can more easily be vectored. • The species is not subject to other vegetation management including conservation grazing.

Table 7: Criteria used to prioritize target invasive plant species occurrences for treatment. Each criterion is scored on a scale of 1-5, in which 5 meets the criteria based on multiple considerations, 3= meets the criteria to a lesser degree/fewer of the considerations, 1=does not meet the criterion/reflects few or none of the considerations. Scores of 2 and 4 are assigned to intermediate levels.

Criteria	Definition	Considerations
Multibenefit **1= Less Benefits** **5 = More benefits**	Treatment will enhance other preserve conservation values including working lands, scenic values, and cultural resources, and promote the Authority's policies and programs including community engagement.	• Treatment will promote condition of lands used for conservation grazing and cultivation on or near the preserve. • Treatment will protect cultural resources, including by promoting natural community structure and species composition in important cultural landscapes. • Treatment will enhance scenic qualities of OSA preserves, including by opening up vistas or controlling infestations along trail corridors. • Treatment can enhance the Authority's relationships with its neighbors. • Treatment presents opportunities to engage the community in volunteer stewardship. • Treatment provides the opportunity for the Authority to demonstrate and perhaps interpret its land management program to the community.
Feasibility **1 = Less Feasible** **5 = More Feasible**	Treatments are likely to be effective, and their cost are appropriate given the treatment benefits, including in reducing risk.	• A known treatment has been proven effective within the site or similar systems is available and will likely achieve the treatment goal and objective. • The resources required to achieve and then maintain the treatment goal and objective over time are relatively certain and are proportional to the benefits. • The species is either absent or effectively managed on neighboring lands, such that reinvasion from adjacent lands will not significantly impede work to achieve the treatment goal and will enable it to be sustainable. • Treatment is compatible with other activities in the preserve, including conservation grazing, agriculture, and public access (e.g. recreation, programs, etc.). • Treatment can be safely conducted using treatments that minimize risk to staff and public of exposure to harmful chemicals, steep slopes, or other unsafe working conditions.

To expedite and promote consistency of scoring, it should be conducted by preserve, working geographically; this is because factors influencing the scores are spatially correlated (i.e. co-occur). For example, a series of different invasive plant species occurrences located along a road through serpentine grassland occupied by Bay checkerspot butterfly will share common considerations for the benefit and risk scores.

The criteria and scores can be adjusted, and score multipliers (i.e. weights) can be incorporated, as needed, to ensure that the prioritization scheme continues to reflect the factors that influence efficacious and sustainable invasive plant management. The prioritization should be updated each year, as resources allow, in order to address changes in the occurrence, the results of prior control treatments, and new scientific information, among other changes (Section 3.2.8.1) and should generally be no longer than five years.

3.2.4.2 Determine Overall Priority

The scores for each criterion will be entered in the GIS database of invasive plant occurrences, or an Excel spreadsheet that can be joined to it based on the unique identifier for each occurrence. The total score, which will range between 4 and 20, will be analyzed using frequency distributions, and based on the total acres of invasive occurrences in each score, to identify the range of total score values (i.e. bins) to include in each of three more generalized priority categories: high, medium, and low.

- **High:** These occurrences are the greatest priority for treatment, as their eradication or control can result in the greatest benefits (including by reducing risk) and is relatively feasible. Efforts will be taken to treat them wherever possible.
- **Medium:** Treatment of these occurrences is important but the benefits, risk, and/or feasibility of achieving the goal are lower than for the high-priority species. They will be treated as resources allow, including in conjunction with treatment of high-priority occurrences, which reduces costs.
- **Low Priority:** These occurrences have lower impacts on the listed species, such as the benefits and/or reduced risks associated with their management, and in some cases the feasibility of treatment, is lower. These species will not be treated unless doing so requires little effort and can be readily accomplished perhaps in conjunction with the treatment of high- and/or medium-priority species.

3.2.5 Strategize and Treat

Strategies will be developed to achieve the management goal for each invasive plant occurrence identified as a high priority for treatment as resources allow. If medium priority sites can be treated in conjunction with high priority sites, strategies will be developed for them as well. They will be based upon the best available information about effective control techniques and in consideration of factors that will influence their effectiveness, as well as effects on non-target species, including sensitive habitats and special-status species, as well as people.

3.2.5.1 Strategy Elements

Strategies will identify the “who, what, when, where, why, and how” of the treatment (Table 8).

Table 8: Elements of strategies to be developed to achieve the goals for each priority invasive plant occurrences, showing examples for a hypothetical occurrence of yellow starthistle.

Strategy Component	Strategy Elements	Example
What: what is to be accomplished	Goal for the occurrence	Eradicate yellow star thistle from occurrence YST-5—a 0.1-acre infestation in Pasture 5 at Rancho Cañada del Oro.
	Objectives for each year of anticipated treatment	• 2016: Prevent spread, reduce YST cover to <20%, increase native plant cover to >50% • 2017: Prevent spread and reduce cover from to <10%, increase native plant cover to >60% • 2018: Prevent spread and reduce cover to <5%, increase native plant cover to >65% • 2019: Prevent spread and reduce cover to <1%, increase native plant cover to >65% • 2020: Eliminate YST from the site (cover=0%) and achieve at least 65% native plant cover
How: the methods that will be used to conduct the treatment and limit its negative impacts	Control Technique(s):	Graze cattle during May and June Hand pull remaining flowering plants in June or July before they set seed.
	Biomass Removal Methods	Dispose of any inflorescences in a plastic bag, as seeds can mature if left on site
	Resource Protection Measures	Flag sensitive plants in the treatment area prior to work if volunteers or others who cannot identify rare plants will be pulling.
	Safety Measures	Provide gloves for hand pulling.
	Restoration Measures	Native plant cover is high and will increase as YST is removed, such that passive revegetation is anticipated to provide the desired native plant assemblage post treatment.
When: the treatment timeline and timing	Timeline	Annually for 5 years, or as needed to achieve the goal and objectives
	Frequency	Annually
	Seasonal timing	When plants bolt and begin to flower (see *Control Techniques*)
Where: geographic information about the treatment	Access	Work crews will use the main ranch road for vehicle access and equipment/materials staging, and approach the infestation on foot.
	Geographic Approach to Treatment	Crews will treat the entire area each year, working from upslope to downslope.
Who: the personnel who will implement the treatments	Qualifications	Authority personnel experienced in YST ID will lead the hand-pulling crew.
	Level of Effort	• 2016:40 person hours (10 people for one, 4-hour volunteer event) • 2017: 32 people yours (8 people for one, 4 volunteer event) • 2018: 24 person hours (6 people for one, 4 volunteer event) • 2019: 16 person hours (4 staff for 4 hours) • 2020: 8 person hours (2 people for 4 hours)

Within the strategy categories, the “what” element will specify the goal and objectives for the treatment, consistent with the overall goal setting for the occurrence (Section 3.2.3). If the treatment is anticipated to occur over a period of years, quantitative objectives will be provided for each year to gauge the treatment progress over time, and inform need to modify it as part of adaptive management.

The “how” element will identify the specific methods that will be used to conduct the treatment, including the following:

1. **Control Technique:** the detailed treatment or sequence of treatments that will be used to treat the invasive plant;
2. **Biomass Removal:** the steps that will be taken to address the biomass, as needed, to limit its impacts;
3. **Resource Protection:** measures that will be implemented to protect native plants, animals, and other natural and cultural resources (Section 3.2.5.6);
4. **Safety:** measures that will be taken to reduce the risks to human health and safety; and
5. **Restoration:** measures to control erosion and/or establish native plants.

The “when” element will address all aspects of timing the treatment or sequence of treatments, in terms of:

1. the time of year (e.g. month or season) and/or phenological state of the plants to be treated;
2. the project timeline, in terms of the number of years that treatment will be required; and
3. the treatment frequency, in terms of the number of annual treatments.

The ‘where’ element will specify any geographic components of the strategy, including:

1. Access routes or staging areas to limit soil disturbance, trampling, and other negative impacts associated with the treatment;
2. Spatial phases of the treatment, such as starting on the perimeter of the patch and working inward, or beginning with the upstream / upslope extent and progressing downstream / downslope.

Finally, the “who” component of the strategy will specify the personnel involved, in terms of:

1. Qualifications required, including specific licenses such as a qualified pesticide applicators license or chainsaw certification, or skills such as native plant identification; and
2. The level of effort anticipated to implement the treatment, in person hours (or days), which might be expected to decline as treatment progresses.

Assembling the strategy information outlined in Table 8 in the database of prioritized occurrences (e.g. Excel workbook) can facilitate work planning and as well as monitoring.

3.2.5.2 Strategy Development

Strategies will be devised for each occurrence in consideration of aspects of the following:

- the invasive species’ ecology, including its life history, life form, reproduction (e.g. seed production and dispersal), vegetative regrowth/reproduction potential, among others;

- the occurrence, including patch size and density and location with respect to features that could promote its spread, including roads and trails, streams, and prevailing winds; and
- the system in which it occurs, including occurrences of other invasive plants proposed for treatment, proximity to sensitive species, communities, and water bodies, as well as human activities, including trails, roads, and residences.

3.2.5.3 Control Techniques

A variety of techniques can be used to control invasive plants in natural lands (Table 9). These include chemical, cultural, and biological methods, as well as manual, mechanical, other physical techniques. Additional discussion of chemical applications is found below (Section 3.2.5.4). A detailed assessment of these techniques, which is necessary to develop effective strategies, is beyond the scope of this manual, and instead, can be found in a variety of resources including:

1. *Weed Control Methods Handbook* (Tu et al. 2001);
2. *Invasive plants of California's Wildlands* (Bossard et al. 2000); and
3. *Weed Workers Handbook* (The Watershed Project and Cal-IPC 2004)

The resources above provide detailed descriptions of the various techniques, identify the types of conditions in which they are most appropriate as well as those when they are inappropriate, and provide additional information that can be used to design strategies. Additional guides have been developed for particularly problematic invasive plants such as yellow star thistle (DiTomaso et al. 2006). Additional and updated information is often shared at invasive plant management trainings and conferences, including the Cal-IPC Symposium, Weed Management Area meetings, and the Central Coast Invasive Weed Symposium (Section 3.2.9.1).

As part of the IPM approach, the Authority will identify the most appropriate technique for each plant occurrence based on a variety of factors including the:

- Risk to the safety of staff, visitors, neighbors, or other people;
- effectiveness at killing the invasive plant;
- risk to native plants, animals, aquatic systems, and other natural resources;
- risk to cultural resources; and
- cost-effectiveness.

Techniques vary in effectiveness. In some cases, a combination of treatments is necessary to meet control or eradication goals. For example, application of herbicide following cutting French broom (i.e. a cut stump treatment) increases the rate of mortality of this invasive shrub, which can otherwise resprout. As another example, burning followed by application of a broadleaf herbicide has been found to help control yellow star thistle (DiTomaso et al. 2006).

Table 9: Invasive plant control techniques evaluated as part of the IPM approach

Category	Specific Techniques	Advantages	Disadvantages	General Circumstances when it is Appropriate
Manual and Mechanical	• Pulling by hand or with the aid of a wrench • Digging or uprooting • Scraping • Cutting, mowing, weed whipping, and brush cutting • Girdling, frilling, and drilling	• Can require limited training • Can pose limited safety concern	• Can be labor intensive • Can cause soil disturbance that promotes invasive plants • Can impact native plants and animals	• When controlling small infestations. • When working with volunteers or other large groups. • When working along trails or other facilities and public places when people are present. • For pulling or digging, when soil disturbance will not promote seedling establishment. • For mowing, when rare native plants, animals, and nesting birds are not present. • For girdling, frilling, and drilling, when large shrubs and trees can be left standing and not present a fire danger
Other Physical	• Tarping • Solarizing • Flaming • Mulching	• Can kill invasive plants in dense infestations	• Can kill native plants and animals in treatment areas	• Dense infestations/monocultures of primarily herbaceous plants or shrub seedlings. • Areas that lack sensitive native plants and animals. • For flaming, during or immediately after rain when humidity is high, and in areas lacking dense, fine fuels.
Chemical	Synthetic chemicals applied through a variety of techniques including: • Cut-stump • Foliar spray • Wicking	• Often highly effective at killing plants • Can be very cost-effective • Can be used to target specific species or groups of species (e.g. grass-specific herbicides)	• Require consultation to identify appropriate treatments • Require training to handle and apply chemicals • Can impact non-target species • Can present a risk to human health and safety	• Early in the season for herbaceous plants. • In order to prevent re-sprouting of shrubs and trees (i.e. for cut-stump treatment). • When climatic conditions are appropriate (no rain or dense fog, wind less than 5 mph). • At a sufficient buffer distances away from sensitive plant and animal populations. • When working with trained staff (rather than volunteers).
Cultural	• Cattle grazing • Goat and sheep grazing • Prescribed burning	• Can be used to treat large areas • Can have other benefits for	• Can impact non-target species as well as water resources if not	Grazing: • When controlling dense infestations of palatable plants that are not promoted by disturbance (i.e. trampling by cattle)

Table 9: Invasive plant control techniques evaluated as part of the IPM approach

Category	Specific Techniques	Advantages	Disadvantages	General Circumstances when it is Appropriate
	• Active Revegetation	habitat and fuel reduction	carefully implemented • Can be logistically challenging in areas open to the public • Some invasive plants pose a risk to some grazing animals	• At a sufficient buffer distances away from sensitive plant and animal populations that could be affected by grazers. Fire/Prescribed Burn: • When controlling dense infestations of species that are killed by fire (as opposed to fire-adapted species) • When controlling invasive plants in fire-adapted systems such as grassland, coastal scrub, and chaparral, rather than fire-sensitive systems such as riparian woodland. Revegetation: • Following disturbances that remove established native plant cover, including construction, restoration, and intensive exotic plant removal projects. • When natural recruitment by native plants is anticipated to be insufficient to suppress exotic plant reinvasion.
Biological	Release of a biological control agent, typically an insect, that targets invasive species.	Typically very targeted control (i.e. limited impacts to other plants and animals)	• Limited availability of biological control agents • Potential for biological control agents to impact native plants and animals through competition and hybridization.	• When an approved biological control agent is available, and no rare native plants could be impacted

3.2.5.4 Chemical Control

Careful and judicious use of herbicides will be an essential component of the Authority's IPM program, in which the most effective, least toxic treatment options are used to control invasive plants. While non-chemical strategies will be employed when feasible, herbicides will be used when there is no other available reasonable means to control invasive plant populations and reduce the impacts on biodiversity and other conservation values on Authority's lands in a variety of circumstances including when:

- invasive plant occurrences cover a large area that would be infeasible to treat by other means;
- controlling invasive herbs and vines that can re-establish from roots and other structures left in the ground following removal; and
- controlling invasive shrubs and trees that will resprout following cutting if they are not treated with herbicide.

3.2.5.4.1 Herbicide Selection

A variety of herbicides have been approved for use in natural lands management. They differ in the mechanisms by which they impact plants (i.e. mode of action), chemical composition, and specific formulation or brand name. These and other factors influence their effectiveness at controlling different types of plants, including grasses, broadleaf plants, and woody plants at different life stages (e.g. seeds, seedlings, vegetative plants, reproductive plants etc.). Their chemistry also determines their toxicity to humans and other non-target organisms, and their persistence in soil and water.

The Authority will evaluate herbicide characteristics, including information on the herbicide label, and available information about the effectiveness of the herbicides at controlling the target species, when selecting an herbicide. In unique circumstances, the Authority will seek recommendations from a licensed pest control advisor with experience advising on invasive plant control in natural lands.

In general, herbicides will be used that are effective against the invasive plants, not likely to drift, leach to groundwater or wash into streams, are nontoxic to people and other organisms, will not persist in the environment, and are easy to apply. A single application of a more toxic or persistent chemical may be preferable to a less persistent, less toxic compound that must be applied repeatedly. These trade-offs will be evaluated on a case-by-case basis, to minimize the negative impact to the environment.

Table 10, List of chemicals used for invasive plant control

Table 10: Pesticides Selected to Support the IPM Program

Pesticide Category	Active Ingredient	Product Formulations (Manufacturer)	Purpose
Herbicides	Glyphosate	Roundup (Monsanto or Scotts Miracle-Gro)	Nonselective post-emergent broad-spectrum weed control
	Pelargonic Acid	Scythe (Dow AgroSciences)	Broad-spectrum control of many annual, biennial, and perennial broadleaf weeds
	Aminopyralid/Triclopyr	Milestone (Dow AgroSciences) Capstone (Dow AgroSciences)	Nonselective post-emergent broad-spectrum weed control
	Clopyralid	Transline (Dow AgroSciences)	Selective broadleaf weed control

Table 10: **Pesticides Selected to Support the IPM Program**

Pesticide Category	Active Ingredient	Product Formulations (Manufacturer)	Purpose
	Imazapyr	Polaris (Nufarm), Stalker (BASF)	Nonselective pre-and post-emergent broad-spectrum weed control
	Clethodim	Envoy Plus (Valent)	Selective post-emergent grass weed control
	Chlorsulfuron	Telar XP (Du Pont)	Pre- and post-emergent broadleaf weed control
	Fluroxypyr 1-methylheptyl ester	Vista XRT (Dow AgroSciences)	Broadleaf annual and perennial weeds, and certain woody plants and vines
	Essential oils	WeedZap (JHBiotech)	All natural non-selective broadleaf weed control
	Dithiopyr	Dimension (Dow AgroSciences)	Pre-emergent grasses and broadleaf weed control
	Isoxaben	Gallery (Dow AgroSciences)	Pre-emergent broadleaf weed control
	Dimethylamine salt	2,4-D	Broadleaf weeds and brush control
Rodenticide	Cholecalciferol	Cholecalciferol baits	Rodent pest control (e.g., rats, mice)
Insecticides	Pyrethrin	Wasp-Freeze (BASF)	Wasp and hornet control
	Insecticidal Soap Spray	Garden Safe	Ant control
	Indoxacarb	Advion Gel Baits (DuPont)	Structural pest control (e.g., ants, cockroaches)
	Hydroprene	Gentrol Point Source (Wellmark International)	Pest control (e.g., cockroaches, beetles, moths)
	Fipronil	Maxforce Bait Stations (Bayer)	Ant control
	Boric Acid (Sodium tetraborate decahydrate)	Prescription Treatment Baits (BASF), Terro Ant Killer II (Terro)	Ant and cockroach control
	Diatomaceous earth	Diatomaceous earth	Structural pest control (e.g., ants, cockroaches)
Fumigant	Sulfuryl fluoride	Vikane, Zythor, or Master Fume	Structural pest control (e.g., termites)

3.2.5.5 Herbicide Use

Safe and effective use of herbicides requires adherence to a variety of laws and regulations, as well as additional best management practices. Crucially, herbicide use and storage must adhere to the herbicide labels—legal documents that all pesticide users are obligated to read and obey. Labels provide instructions and precautions for mixing, application, disposal, and storage of the herbicide, as well as information and precautions related to toxicology and environmental hazards. Additional safety information is contained in the material safety data sheet (MSDS) available for each product. Authority staff also receive pest control recommendations for each property from a licensed Pest Control Advisor (PCA). Authority staff work with PCAs that are familiar with invasive plant control on open space lands.

Though beyond the scope of this manual, detailed guidelines for herbicide use are provided in Chapter 5 of the *Weed Control Methods Handbook* (Tu et al. 2001), a link to which is in the *References* section.

3.2.5.6 Species and Environmental Protection Measures

Though invasive plant control is necessary to promote native plants and animals and restore sensitive habitat where it has been degraded, certain treatments have the potential to cause short-term negative impacts to sensitive biological resources, including rare plants, rare animals, and nesting birds. This section outlines some approaches to limiting those impacts, which are summarized below in Table 10. The precise nature of measures to protect rare species and nesting birds should be determined in consideration of the ecology of the species and conditions within the treatment area and proposed aspects of the invasive plant treatment. If impacts to federal or state-listed threatened or endangered species cannot be avoided, the Authority should consult with the wildlife agencies prior to project implementation.

3.2.5.6.1 Rare Plants

Many invasive plant control techniques have the potential to negatively impact rare native plant species occurring within or near the treatment area. Prior to treatment, any areas known or likely to support rare plants should be surveyed to determine whether rare species are present. Surveys should be conducted during the flower period for the rare species (typically March to July); if surveys cannot be conducted during that period, the area should be treated as potentially occupied and measures should be taken to limit treatment impacts.

If rare plants are encountered within a proposed treatment area, the treatment area or method including seasonal timing should be adjusted to avoid impacts. If that is not possible, rare plants propagules should be salvaged prior to treatment and used in the restoration, which should be designed to increase their population over that present pre-treatment, although the use of salvaged plants is dependent on the emerging science for controlling *Phytophthora* and other pest diseases (Section 3.3)

3.2.5.6.2 Nesting Birds

During the bird breeding season, which is generally February 1 and August 31, certain invasive plant control treatments can directly impact nests, which are primarily built in vegetation including invasive plants, or by causing the parents to abandon a nest. Such take of nests, eggs, or nestlings is prohibited by the Federal Migratory Bird Treaty Act (16 U.S.C. 703-712) as well as the California Fish and Game Code (Section 3503).

To prevent impacts to nesting birds, the Authority will conduct invasive plant removal outside of the nesting bird season whenever possible. When effective invasive plant control requires that treatments be conducted between February 1 and August 31, the Authority will conduct a pre-treatment nesting bird survey within 250 feet of the treatment area for raptors, and 50 feet of the treatment area for all other birds. If a nest is found within the survey area, the treatment will be delayed until the young have fledged, or the nest has otherwise been abandoned. Alternatively, the treatment area will be reduced to establish no-treatment buffer zones around the nest to avoid disrupting the nest.

Table 11: Protection measures for sensitive habitats, rare plants, nesting birds, and sensitive animals when conducting invasive plant control.

Sensitive Resource	Measure	Description
Aquatic Habitat	Conduct a Pre-Project Survey and Establish Buffers	All treatment areas will be surveyed for the presence of lakes, ponds, streams, drainages, seeps, springs, saturated soils, or similar feature that holds water at the time of treatment or typically becomes inundated during winter rains. The Authority will eliminate treatment activities within 15 feet of any aquatic features or consult with CDFW.
Rare Plants	Conduct a Pre-Project Survey and Establish Buffers	All treatment areas should be surveyed prior to work to determine the potential presence of special-status plants. Within a 15-foot buffer around special-status plants, either selective herbicides or no herbicides should be used and non-chemical treatments should be designed to avoid damage to the rare plants (e.g., pulling).
	Conduct Treatments when Species Are Not Present Aboveground	Many rare native plants are annual plants, which persist over the summer as seed that germinates in the fall with the onset of the rainy season. Conducting mechanical treatments during this time can reduce impacts to these species. Herbicide treatments conducted using chemicals that do not affect seed can similarly be conducted during this time.
	Establish Buffer Zones Around Rare Plants	Rare plant species within a treatment area should be flagged and alternative treatments that avoid impacts to them should be developed in appropriate buffer areas around them. For example, invasive plants should be cut or pulled by hand rather than weed whipped or mowed within 5 feet of rare plants. Manual treatments or selective herbicides with a hand sprayer should be used within 15 feet of rare plants.
	Salvage Rare Plant Propagules Pre-Treatment	Seed or other propagules of rare plants can be collected prior to treatment, and then utilized in restoration post-treatment.
Nesting Birds	Conduct Treatments outside of the Bird Nesting Season	To avoid impacts to nesting birds, conduct invasive plant control treatments outside of the bird nesting period, which is generally February 1 – August 31.
	Establish Buffer Zones around Nests	If invasive plant control work must be conducted during the nesting bird season (February 1 – August 31), conduct a nesting bird survey within 14 days of treatment. The survey should encompass the area within a 250-foot radius for raptors, and 50-foot-radius for other birds. If nesting birds are identified, delay work within these buffer areas until the young have fledged or the nest is otherwise abandoned.
California Red-Legged Frog	Conduct Surveys and Establish Buffer Zones	All treatment areas will be surveyed to evaluate whether they feature suitable aquatic or upland habitat for California red-legged frog (CRLF). The Authority will eliminate any mechanical or chemical treatments within 15 feet of occupied habitat for CRLF, or consult with USFWS and CDFW to identify appropriate permitting and mitigation measures.
	Limit Use of Restricted Pesticides	Herbicide use in CRLF habitat should be conducted in accordance with the California Red-Legged Frog Injunction (Center for Biological Diversity v. U.S. Environmental Protection Agency (2006) Case No.: 02-1580-JSW) by:

Table 11: Protection measures for sensitive habitats, rare plants, nesting birds, and sensitive animals when conducting invasive plant control.

Sensitive Resource	Measure	Description
		• Not applying glyphosate within 15 feet of aquatic features (including areas that are wet at time of spraying or areas that are dry at time of spraying but subsequently might be wet during the next winter season); • utilizing only spot-spraying techniques and equipment by a certified applicator or person working under the direct supervision of a certified applicator; and • not spraying during precipitation or if precipitation is forecast to occur within 24 hours before or after the proposed application.

3.2.5.6.3 Rare Animals

Authority open space preserves support numerous rare animal species that have the potential to be impacted in the short term by invasive plant control treatments. As for rare plants, the Authority will conduct a habitat assessment for rare animals, in areas known or likely to support rare species, prior to implementation of invasive plant treatments. Any species protection measures for rare animals will be developed based on careful consideration of the ecology of the animal, the conditions of the treatment area, the proposed treatment, and the applicable regulations for listed species. These include the terms of the two court injunctions that have been established to regulate pesticide use for California red-legged frog (*Rana draytonii*; Case No.: 02-1580-JSW) and 10 additional Bay Area species, including California tiger salamander (*Ambystoma californiense*). These requirements are summarized in Table 11.

3.2.5.7 Treatment Documentation

In order to track invasive plant work on an annual basis, and to enable evaluation of the effectiveness of invasive plant treatments, all treatment work will be documented in a database that captures the most relevant information (Table 12). Information to be collected will include general and specific method and treatment type, number of staff or volunteer hours required, dimensions of the treatment, and any notes about the occurrence to inform management efforts.

Table 12: Information to be collected for each treated invasive plant occurrence in addition to the data to be collected for all invasive plant occurrences (Table 5).

Variable	Description	Coding
Method	General type of method used	Use the following categories: • mechanical • chemical
Staff Hours	Indicate the number of hours spent by staff implementing the treatment	Number of person hours
Volunteer Hours	Indicate the number of hours spent by volunteers implementing the treatment	Number of person hours
Notes	Any notes about the occurrences that can inform management	Narrative text

[1] Six letter species codes are created by combining the first three letters of the genus and the first three letter of the species. For infraspecific taxa, the six letter code is the first two letters of the genus, the first two letters of the species, and the first two letters of the variety or subspecies.

3.2.6 Restore

Many invasive plants are adapted to establishing in areas of recent disturbance, which reduces competition of native plants and often creates open soil conditions required by many invasive species. Restoring formerly invaded sites to create later-successional conditions can help deter invasive plants while also recreating habitat conditions suitable for natives.

Restoration can occur passively, whereby native plants naturally recolonize following disturbance, or actively, by seeding or planting native plants, often in conjunction with treatments designed to promote their growth. Provided that native plant propagules remain on site, in the seed bank and in remnant native plants, or are in close proximity such that they can disperse into the restoration area, passive restoration can re-create the natural community structure and species composition over time. The natural successional processes can promote diverse assemblages of native plants that can be difficult to achieve with active restoration methods. Passive restoration can be less costly; managers need only control invasive plants and perhaps other exotic plant species that compete with native species. However, it can be slower and result in less dense cover than can be achieved in active restoration.

Active restoration techniques may be necessary to achieve the goals for the site (Kettenring and Adams 2011), including preventing establishment of invasive plants, in a variety of circumstances including:

1. Areas of intensive disturbance, where the native plant propagule supply may be limited;
2. Large disturbance areas, where the timeline for native plant establishment will be too slow;
3. Areas where mid to late successional conditions, characterized by denser cover of native plants including shrubs and trees, are needed to achieve the restoration goals, including to prevent erosion and suppress growth of invasive plants

Restoration may also be needed where invasive plant control has rendered the soil vulnerable to erosion, including in areas that have been denuded and/or occur on steep or erosive soils. Where invasive plants have altered soil chemistry (i.e. through allelopathy), treatments such as application of activated charcoal may be needed to restore plant-microbial relationships necessary to support native plants.

Table 13, below, outlines some general active restoration techniques that can be used to suppress reestablishment of invasive plants, restore natural community structure and species composition, and thus recreate habitat for native animals. Each of these treatments has advantages as well as disadvantages for promoting native biodiversity (Table 13). These and other aspects of restoration treatments should be designed for each site based on careful consideration of the variety of factors including the site conditions and the invasive plant species being controlled.

Notably, some restoration treatments can inadvertently promote invasive plant species; while potentially necessary to establish native plants, they should be designed and implemented with caution. For example, fertilizers and other soil amendments, as well as irrigation, can increase availability of nutrients and water that are often limiting factors for invasive plants, giving them a competitive advantage over native plants, which are adapted to low-nutrient, droughty soil conditions that predominate in the region.

Additionally, active restoration materials can be contaminated by invasive plant seed. These include:

- Topsoil brought in to restore areas where soil has been removed;
- Straw, mulch, or other surface treatment materials;
- Native plant seed mixes; and
- Container stock from nurseries.

Weed free materials should be used whenever possible, and all restoration sites should be subject to frequent monitoring to detect and eradicate invasive plants before they can spread.

Table 13: Active restoration techniques that can be employed following invasive plant treatment

Technique	Description	Advantages	Disadvantages
Mulch	Applying straw, shredded back, wood chips, or similar materials to the soil surface	• Can stabilize soil denuded by invasive plant removal. • Can inhibit establishment of many small-seeded, early successional invasive plants. • Carbon addition can immobilize excess soil nitrogen created by French broom, *Acacia* species, and other N-fixers, thus reducing the potential for a secondary invasion by N-limited invasive grasses.	• Can suppress re-establishment of native plants that are adapted to disturbance but inhibited by litter on the soil surface. • Can degrade habitat for native animals adapted to open soil conditions. • Can promote the invasive and spread of exotic plants if materials are contaminated.
Amendments	Applying fertilizers, mycorrhizal inoculum, or activated	Fertilizers and mycorrhizal inoculum can promote growth of native plants where nutrients are limited or imbalanced due to prior invasive plant infestation or its control.	• Can promote growth by invasive plants that are nutrient limited and outcompete native plants. • Can introduce non-local fungal strains into the ecosystem (i.e.

Table 13: Active restoration techniques that can be employed following invasive plant treatment

Technique	Description	Advantages	Disadvantages
	charcoal or other materials to promote soil fertility and plant microbial relationships	Activated charcoal can restore plant microbial relationships where invasive plants have altered them through their chemistry (i.e. allelopathy).	from inoculum), which may disrupt natural mycorrhizal relationships with native plants. • Can fertilize nearby streams and ponds, degrading aquatic habitat.
Seeding Native Plants	Applying native plant seed to treatment areas following control	Can increase the density and diversity of native plants, which can: • Restore native animal habitat • Suppress re-establishment of invasive plants.	• Commercially-sourced seed can cause *genetic erosion*—disruption of locally-adapted genetic complexes in native plant populations, particularly unique systems (e.g. serpentine) which feature unique *ecotypes*. • Seed of plants not native to the site can alter the natural community structure and species composition for native animals. • Contaminated seed can introduce exotic plants.
Outplanting Native Plants	Installing native plants grown in containers into treatment areas following control	Can more rapidly (compared to seeding) increase the density and diversity of native plants, which can: • Restore native animal habitat • Suppress re-establishment of invasive plants, particularly by planting shrubs and trees which reduce light availability	• If not locally sourced, plants can cause genetic erosion as for commercial seed (as above). • Plants not native to the site can alter animal habitat (as above). • Can spread pathogens including sudden oak death if plants from nurseries are not screened. • Contaminated container stock can introduce invasive plants (e.g. *Oxalis pes-caprae*)
Irrigation	Applying water manually, or using overhead sprinklers or to drip irrigation	• Can promote native plant seedling establishment and growth • Can enhance survivorship and growth of native plants planted from container stock	• Can promote re-establishment of invasive plants, which can outcompete native species • Can promote pathogens of native plants not adapted to moisture during the dry season. • Can degrade habitat for native animals not adapted to moist conditions in the dry season. • Costly to install and maintain

3.2.7 Monitor

The amount of time devoted to monitoring is dependent on Authority staff time. However, monitoring is an important component of the IPM Program and will be used to achieve two goals related to invasive plant management:

1. Evaluate the effectiveness of treatments at controlling invasive plants and promoting natural community structure and species composition (i.e. native plants); and
2. Assess the invasive plant species distributions in the preserves, in order to detect new species as well as other changes not due to management.

3.2.7.1 Conduct Effectiveness Monitoring

The effectiveness of invasive plant control treatments will be evaluated through one or more of a series of monitoring methods (Table 14). The methods listed in the table reflect a gradient of increasing information gained. They also represent increased level of effort required to assess and evaluate the results, such that more intensive quantitative monitoring will only be used when treatment effectiveness is uncertain.

Table 14: Methods for monitoring effectiveness of invasive plant control treatments.

Method	Description	Use
Areal Extent Mapping	A polygon delimiting the treatment area is mapped pre-treatment, and again post-treatment, and information about invasive relative species abundance and cover is recorded each time to evaluate the effectiveness of the treatment at reducing cover, abundance, and/or areal extent of the infestation. Additional information about the treatment is also recorded in treatment mapping conducted following implementation (Section 3.2.7), to facilitate evaluation of the effectiveness of the treatment and also tracking of the invasive plant management activities (Tables 6 and 11).	This approach should be used wherever practicable. A subset of occurrences of each species and within each preserve could be monitored to reduce overall monitoring effort, as needed.
Photomonitoring	Photographs are taken at specified angles from permanently monumented and georeferenced photostations before the treatment and then again the same time the year (or for multiple years) following treatment, to qualitatively assess changes in the invasive plant species abundance and also the structure and cover of plants re-establishing in the treatment area. Photos of plant occurrences and treatment are also collected in the Calflora app.	Can be used independently or in conjunction with areal extent mapping to evaluate effectiveness of the invasive plant control treatments, and restoration of the native plant community, when the treatment outcomes are uncertain.
Quantitative Monitoring	Establish replicate, permanent plots (or transects) in the treatment area pre-treatment and revisit post treatment. Alternatively, establish plots in areas receiving various treatments, as well as a portion of the invasive plant occurrence that will be untreated (control) area, to compare effectiveness of alternative treatments, including restoration treatments. Measure invasive plant density and cover as well as the cover of other native plants by species, and compare pre-and post-treatment results or results among treatments and over time.	Can facilitate assessment of the effectiveness of invasive plant control at promoting native plant diversity, and also evaluate associated revegetation treatments such as mulching, seeding, and planting. Can also be used to compare alternative control treatments (e.g. manual versus chemical) or restoration treatments (e.g. seed, out plant native plants, etc.).

3.2.7.2 Update the Invasive Plant Inventory

The status of invasive plants within the preserves will be monitored over time by updating the polygons, lines and points mapped during the initial inventory (Section 3.2.2.3). Mapping of invasive plant occurrences that are subject to control will be updated through the effectiveness monitoring outlined in Table 14, above. Existing occurrences that are not subject to control because they are low priority will be remapped during periodic inventory updates conducted every five years, or as resources allow. During such updated mapping, new invasive plant species occurrences will also be incorporated into the inventory. New invasive plant occurrences observed during early detection and rapid response will be mapped when they are encountered at which time they will also be treated, as feasible (Section 3.2.1).

3.2.8 Adapt

Invasive plant management in natural lands will be implemented through an adaptive framework designed to promote achievement of the goals of the IPM program over time. In the framework, the priorities and strategies will be adjusted based upon the following:

- Results of monitoring to evaluate effectiveness of the treatments (Section 3.2.7.1);
- Periodic updates to the inventory and mapping (Section 3.2.7.2);
- New information about control techniques from scientific literature and other reliable sources; and
- Changes in site conditions, including fire or the invasion of new exotic plant species.

The following processes of annual re-evaluation, work planning, and annual periodic updates are designed to update the program over time.

3.2.8.1 Annual Re-Evaluation and Work Planning

Each year, Authority staff will review the following information:

1. Results of monitoring to evaluate effectiveness of control treatments to date;
2. Current distributions of invasive plant species, including new occurrences mapped during the year;
3. Updated lists of invasive plant species, including species on the Cal-IPC watch list (Cal-IPC 2019); and
4. Updated prioritized list of invasive plant occurrences reflecting new information including new invasions and effects of prior management.

These materials will be reviewed to:

1. Re-assess the treatment priorities, and make adjustments to promote overall effectiveness and cost-effectiveness of the funds available for invasive plant control;
2. Develop a work plan for the year, which identifies the occurrences that will be treated by month; and

3. Update the tools used to conduct EDRR program monitoring, including the target species list and species identification cards.

Authority staff will develop an annual IPM Work Plan that documents the IPM treatment project sites for implementation. An annual IPM Program Report will be developed at the end of each year that will summarize the IPM Program work completed in the previous year, evaluate the Program's progress in meeting goals, and include any recommended modifications to be included the following year.

3.2.8.2 Additional Periodic Updates

Authority staff will also periodically update the plan for managing invasive plants in natural lands, following the step-wise procedure outlined in this chapter, applying new information, approaches, and techniques where appropriate to enhance success. Specifically, the Authority will:

1. **Update the invasive plant occurrence inventory**, including by incorporating any new records or adjusting the boundaries or information about existing records to reflect changes that have not yet been updated in the database
2. **Update the goals for management** of each occurrence, based on results of efforts to date, if any, and other new information about the site (e.g. listed species occurrences) or effectiveness of treatments to control the invasive plants;
3. **Reprioritize invasive plant occurrences** within the open space preserves, based on the benefits of management, threats posed by inaction, and feasibility of achieving the specific goal for the occurrence;
4. **Revise the strategies for invasive plant control**, based on results of prior efforts as well as new information about the most effective techniques; and
5. **Update the prevention resources,** including list of species targeted for control and on the Watch List (Cal-IPC 2016a), species identification cards, and
6. **Revise the restoration techniques,** to reflect the techniques proven most effective at restoring habitat and suppressing invasive plant establishment;
7. **Update the monitoring program,** to ensure that the most important information is collected and evaluated to refine the program;
8. **Revise the education program materials**, as needed, to ensure that Authority staff and the public continue to be educated about the threats posed by invasive plants and the important work that the Authority is doing, with their help, to control them.

After five years of implementation, the Authority will evaluate the program and adjust its elements as appropriate to enhance achievement of the land management goals (Section 1.1).

3.2.9 Educate

Long-term effectiveness of the invasive plant management program will benefit from ongoing education of Authority staff, to stay current on the latest invasive plant management issues and techniques, as well as increasing the awareness and support of the public for invasive plant management.

3.2.9.1 Staff Education

Invasive plant management is an ever-changing field. Techniques are being developed and refined to control invasive plants; meanwhile, new plants are invading the region.

The Authority's staff will stay current on invasive species issues and management through a variety of methods including:

1. Reviewing updated websites and newsletters regarding invasive plant management (*Resources*);
2. Holding internal staff trainings, which can be conducted in conjunction with the annual work planning;
3. Participating in trainings offered by outside organizations, such as Cal-IPC, which offers courses on a variety of relevant invasive plant management topics including identification, mapping, treatment, and monitoring;
4. Participating in regional and statewide meetings or trainings, such as those coordinated by the Santa Clara Weed Management Area; and
5. Attending invasive plant management conferences, such as the annual symposium offered by Cal-IPC and the Central California Invasive Weed Symposium.

3.2.9.2 Public Education

Effectiveness of the IPM program can be enhanced by increasing public understanding of and support for efforts to control invasive plants in the open space preserves. Specific objectives of the education outreach are:

1. Increase public awareness of the impacts invasive plants on the conservation values of the open space preserves, including biodiversity, working lands, water resources, scenic landscapes, and fire management, among others, to promote support of the Authority's initiatives to control invasive plants;
2. Enhance public understanding of the IPM approach to invasive plant management in open space preserves, and the steps that Authority staff take to carefully use herbicides and otherwise limit the negative impacts of all invasive plant control techniques on the natural and cultural resources as well as reduce risk to public health and safety;
3. Inform preserve visitors about the measures they can take to help the Authority control invasive plants, including by taking steps to avoid dispersing invasive plant seed on the shoes, clothes, and vehicles, using weed free hay (for equestrians);
4. Increase public participation in volunteer stewardship programs to control invasive plants in open space preserves; and
5. Inform preserve visitors on specific invasive plants so they have an increased understanding of the landscape.

To achieve these objectives, Authority Natural Resource staff will work with members of the Authority's Community Engagement Team on a variety of education and outreach projects that may include:

1. Incorporating information about invasive plants and their management and the Authority's IPM program more broadly on the Authority's website, which could include this guidance manual as well as informative case studies documenting successful invasive plant management projects with compelling before and after photographs;
2. Including information about invasive plant management including success and volunteer opportunities in e-newsletters;
3. Integrating information about invasive plant species and their management in the docent manual, so that docents can help educate the public as part of their activities;
4. Posting permanent signs at staging areas and other significant trailheads, as well as the Authority's website, that identify measures the public can take to reduce the spread of invasive plants;
5. Posting temporary signs in invasive plant treatment areas located in visitor use areas, that provide information about the project and the broader IPM program;
6. Preparing a handout of Frequently Asked Questions (FAQs) about invasive plant management and IPM, that Authority staff provide to visitors who inquire about invasive plant projects while in open space preserve; and
7. Training docents on invasive plant identification and management.

A variety of organizations, including Cal-IPC, have developed public outreach and education materials related to invasive plants, which can be readily adapted to communicate the Authority's IPM program and invasive plant management efforts to the public (Cal-IPC 2016c).

3.2.10 IPM Program Implementation

The Authority's IPM program is currently implemented by the Land Management Office staff, the Resource Management Specialist, and the Natural Resource Technician. This team is responsible for developing an annual work plan for invasive control, which will follow a general schedule (Table 15). Each year in the fall, the Resource Management Specialist and Natural Resource Technician will work with a designee from the Land Management Office to set goals and prioritize plant occurrences (Sections 3.2.3 and 3.2.4) through an Annual IPM Work Plan. As time and resources allow, a map of each Preserve with the plant occurrences categorized by high, medium, and low priorities will be created or updated. The Annual Work Plan will be given to the Land Management Office for implementation, ideally in January. During the prioritization exercise, volunteer projects will also be identified. These projects will be sent to the Authority's Volunteer Programs Administrator for scheduling.

During the main exotic plant treatment season (February – July), the Natural Resource Technician will meet with a Supervising Open Space Technician on a regular basis to refine the work plan based on weather and plant conditions, workload, and other priority projects. These meetings are also a chance to share new information and discuss if any updates to the manual are needed.

At the end of the year, Authority staff will prepare an IPM Program Report to summarize the IPM work completed and determine if adaptive management is needed.

Table 15: Generalized annual calendar for IPM Program Implementation

Activity	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Prioritize Treatment and Work Plan Development												
Create/Update Prioritization Maps												
Early Detection Monitoring												
Main Treatment Season												
Monitor Treatment												
Annual Program Report and Evaluation												

3.3 Sudden Oak Death and other Diseases Caused by *Phytophthora* Species

Exotic plant diseases have the potential to negatively impact the conservation values of the Authority's preserves. Of particular concern are diseases caused by *Phytophthora* species, as described below.

3.3.1 Sudden Oak Death

Sudden Oak Death (SOD) is a plant disease caused by an exotic water mold (*Phytophthora ramorum*) that has been implicated in native oak and tanoak deaths throughout coastal California and Oregon (CA Oak Mortality Task Force 2016). The disease often results in mortality of certain species of oaks, mainly tan oak (*Notholithocarpus densiflorus*), coast live oak (*Quercus agrifolia*), black oak *(Quercus kelloggii*) and canyon live oak (*Quercus chrysolepis*) but can also cause twig and foliar disease symptoms in many other native plant species. The wholesale loss of oak tree species in coastal forests can cause major ecosystem disruptions, especially because so many native species depend on oaks and their fall acorn masts. Sick and dying trees also greatly increase the wildfire risk in native coastal forests dominated by oaks.

It is still uncertain how the invasive forest pathogen *Phytophthora ramorum* causing SOD will impact the native forests and woodlands of the greater Bay Area. Methods such as the selective thinning of California bay laurel trees, which harbor the pathogen, pesticide applications, and promoting conifers over hardwoods have all been proposed for local and landscape scale management of the SOD pathogen (Filipe et al. 2012). The SOD pathogen is extremely difficult to detect until advanced infection and symptoms are visible in individual plants. Because this pathogen is a water mold, it can move great distances through the landscape using wind (e.g., windborne transport of spores) or through water (e.g. transport of spores in waterways and through fog drop) making management very difficult at any scale (Filipe et al. 2012). The landscape scale management of high value forested areas (e.g. selective removal of diseased trees, selective removal of host plants such as California bay laurel, replanting conifers and other disease-resistant trees) may be one of the few ways to slow the spread of the disease. Authority staff should consult with the California Oak Mortality Task Force (www.suddenoakdeath.org) for the most recent information on effective control of SOD.

3.3.2 Pest Management Strategies for SOD

At this time, SOD has not been detected on Authority lands (SOD Map 2016). If Authority staff notice trees with SOD symptoms, staff will have the trees tested and consult with the California Oak Mortality Task Force. As resources allow, the Authority will participate in SOD Blitzes—coordinated surveys designed to detect the occurrence of SOD—to test trees on Authority Preserves. The following are general steps that may be taken in response to SOD infestations on Authority preserves, if needed:

- Mapping of dead oaks and submit this information to the California Oak Mortality Task Force.
- Removal of California bay trees or their branches within 15 feet of the trunks of high value oaks. This option is costly and requires regular maintenance and monitoring.
- Spot treatment of individual oaks with pest control sprays (e.g., Agri-Fos ™) intended to reduce potential for SOD infection. Due to high cost, this option should not be applied on a landscape level.

3.3.3 *Phytophthora* sp. in Nursery Stock

Recent research has documented the presence of multiple *Phytophthora* species in California native plant nurseries, restoration sites, and native landscapes. Diseases caused by *Phytophthora* species include root rots, stem cankers, and blights of fruits and leaves. When introduced into native ecosystems, various exotic *Phytophthora* species have proven to cause devastating impacts. Infected nursery stock has been shown to be the source of various *Phytophthora* introductions (Swiecki and Bernhardt 2016).

3.3.4 Pest Management Strategies for other *Phytophthora* Diseases

At this time, plants infected with *Phytophthora* or exhibiting symptoms have not been found on Authority lands. Since nurseries are a common way to introduce *Phytophthora* into the landscape, pest management should focus on prevention. This issue is newly emerging and work is underway to develop a certification system to allow consumers to purchase clean native plants with confidence. Authority staff should stay abreast of this issue and any treatment options through the California Native Plant Society, Phytosphere Research, and the U.S. Department of Agriculture.

4 Guidance for Management of Invasive Animals in Natural Lands

4.1 Introduction

Invasive animal management in natural areas first focuses on modifying the behavior of humans or the habitat to moderate or eliminate invasive animal pest problems. After these prevention actions are exhausted, invasive animal populations will be managed to a defined tolerance level. Tolerance levels focus on reducing the pest population down to a level that does not cause substantial harm to natural resources; does not cause severe economic harm/ and/or does not cause disruption of natural processes or severe displacement of native species. The Authority's goal is to maintain the long-term stability and resiliency of its natural areas.

State regulations concerning invasive animals are complex. Some invasive animals in California are regulated for sport and commercial purposes (e.g., feral pigs and bull frogs), other expressly prohibited (e.g., northern pike fish) and others are currently unregulated (e.g., snapping turtles and parrots). To control regulated game species (e.g., feral pigs), special permits obtained from the CDFW may be required. Some invasive wildlife species can be difficult to manage where adjacent landowners manage the same species for sport or profit. The Authority will prioritize specific invasive animals for management that have the greatest potential to impact natural areas. Some regulated game species (e.g., feral pigs) must be controlled under special permits obtained from the CDFW.

4.2 Pest Management Strategies

4.2.1 Non-Native Fish

Non-native fish species are generally found in man-made stock ponds and reservoirs, but some also may occur in natural sag ponds. The Authority identifies the presence of fish during aquatic habitat surveys. Active management of non-native fish in man-made water bodies will not occur unless the water body also supports protected native species such as the California red-legged frog, or in water bodies that are close to ponds with protected native species (where the chances of colony by a protected species increases if the fish population was removed). In order to control these populations, ponds are typically drained for sufficient time to eliminate all non-native fish species then refilled. As most non-native fish species are managed as game fish by the CDFW, special permits are typically required for their control.

4.2.2 Bullfrogs

4.2.2.1 Background Information

The American bullfrog (*Rana catesbeiana)* is a large, brilliant green amphibian that is native to eastern North America. Its natural range does not extend west of the Rocky Mountains and Great Plains, but it is an increasingly common invasive animal in the western United States. Bullfrogs are sold throughout the world as food, pets, fish bait, and for educational purposes. They sometimes become unwanted pets or escape from frog farms and grocery stores, and as a result have readily established themselves in all suitable habitats throughout California. American bullfrogs are most problematic in the Authority because they directly affect the federally Threatened California red-legged frog (*Rana draytonii;* CRLF) and state and federally Threatened California tiger salamander (*Ambystoma californiense;* CTS). In habitats where they exist together, large, overwintering bullfrog tadpoles can compete with or consume CRLF tadpoles and CTS larvae, in addition to other native wildlife species such as newts, other frogs and salamanders, garter snakes, birds, and bats. Their voracious appetites have been implicated in the declines of many North American amphibian species.

In addition to competition and predation, bullfrogs spread chytrid fungus – a lethal skin disease known as chytridmycosis that impacts many of California's native amphibians (Schloegel et al. 2009). Chytrid fungus is a non-native fungal pathogen from Asia that has spread to decimate amphibian populations all over the world. Because bullfrogs are domestically raised for food and educational purposes worldwide, many that are imported to California each year carry the chytrid fungus from unregulated foreign frog farms. As these individual frogs are accidentally or intentionally released into the wild, they help to spread the fungal disease throughout the native amphibian populations.

Bullfrogs are classified by CDFW as a game amphibian and are regulated by state fishing regulations. The permits for bullfrog removal are only valid for 60 days. Bullfrog control efforts will need long-term management in order to be successful. A special permit will be required from CDFW and if listed species are present, a qualified biologist will need to be present (Leicester 2016).

4.2.2.2 Pest Management Strategies for Bullfrogs

4.2.2.2.1 Prevention

- **Education.** Education can be an important tool for the Authority in preventing captive frogs from being intentionally released onto Authority lands. Some people feel ethically motivated to release captive pets and food animals back into natural environments for humane reasons or when they no longer wish to care for them. Public outreach and judiciously placed educational materials such as signs and brochures in Authority preserves with wetlands may be a useful strategy to curb intentional releases of animals.

- **Fencing.** Exclusionary fencing to keep bullfrogs from entering non-infested wetlands is a temporary tool for use while other control methods are applied concurrently. Fencing is not considered a long-term solution because it disrupts movement of other wildlife, can entrap non-target wildlife species, and may disrupt the natural processes of the wetlands. Exclusionary fences are useful during pond draining to limit the potential for dispersal of bullfrogs out of the treatment area. Exclusionary fencing may also be used in conjunction with funnel traps to collect bullfrogs as they attempt to disperse from drying ponds.

4.2.2.2.2 Physical Control

- **Gigging or shooting.** Gigging or shooting American bullfrogs (a pest species not native to California) are two methods that are implemented with small caliber air rifles and lead-free ammunition to eliminate individual adult bullfrogs. Gigging is the targeted spearing of fish or frogs with barbed tines mounted on a long pole. Both gigging and shooting are effective and humane methods for selective removal of target adult bullfrogs. However, this treatment method alone will rarely eradicate bullfrogs from the target area because only a portion of adults are usually found, and it does not control eggs or larval stages. Some studies have indicated that adult metamorph removal (i.e., removal of immature bullfrogs) is the most economical removal method for population suppression (Govindarajulu 2005). Egg masses can also be collected to remove additional life stages at the appropriate time of year.

- **Trapping.** Submerged funnel traps and floating cage traps can be used to control different life stages of American bullfrogs. Funnel traps designed for catching baitfish can be used to live capture bullfrog tadpoles. Floating cage taps have been successfully used to catch adult frogs. Trap designs for bullfrog removal are relatively recent and mainly rely on modifying Australian cane toad traps. Methods designed to trap multiple life stages of frogs in parallel have proven effective for bullfrog management (Snow and Witmer 2011). Though trapping is a recently-developed treatment method for bullfrogs, it may be effective especially where other sensitive amphibian species are present to which impacts must be avoided.

- **Electrical currents.** Use of electrical currents (electroshocking) to temporarily disable frogs in netting and gigging operations have proved to be effective in some control programs (Orchard 2011). 12v DC electroshockers that are typically used in fisheries management are mounted either on small boats or on backpacks, then the electroshock current is applied to the surface of the wetland. This treatment is non-specific and will affect all aquatic species within the range of the electroshocking ‘wand’. Electroshocking is non-lethal, rather it shocks and lifts the affected individuals to the surface where they can be netted or otherwise collected. This treatment method, therefore, must be followed by another treatment method such as hand removal or gigging. Even with follow-up control of individuals found by electroshocking, this treatment method alone will rarely eradicate bullfrogs from the target area because only a portion of adults are usually found, and it does not control eggs or larval stages.

- **Habitat Manipulation.** Pond draining is one of the most common methods used for bullfrog control in California, especially for projects where protected species may be present such as the native California red-legged frog. American bullfrogs need a perennial water source to complete their life cycle. In contrast, California red-legged frogs and California tiger salamanders only need water during their breeding cycle. The USFWS California red-legged frog Recovery Plan recommends draining ponds that contain both bullfrog and California red-legged frog species every year to reduce the habitat suitability for bullfrogs (USFWS 2002b). Type conversion of permanent stock ponds to ephemeral wetlands can also reduce bullfrog populations across a landscape scale but permitting requirements may be a barrier to feasibility.

- **Exclusionary Fencing.** The Authority may install exclusionary fencing to keep bullfrogs from entering non-infested wetlands as a temporary preventative tool for use while other control methods are applied concurrently. Fencing is not considered a long-term solution because it disrupts movement of other wildlife, can entrap non-target wildlife species, and may disrupt the natural processes of the wetlands. Exclusionary fences are useful during pond draining to limit the potential for dispersal of bullfrogs out of the treatment area. Exclusionary fencing may also be used in conjunction with funnel traps to collect bullfrogs as they attempt to disperse from drying ponds.

4.2.2.2.3 Chemical Control

No toxicants or fertility control treatments are registered for use in controlling bullfrogs in California.

4.2.3 Other Non-native Amphibians and Reptiles

Several species of non-native turtles are known to occur in Authority ponds and water bodies. These species are common food items for Bay Area ethnic communities and/or pet species. The red-eared slider (*Trachemys scripta elegans*) is the most common species expected to occur. Red-eared sliders are managed as game fish species in California. The Authority does not actively manage red-eared sliders unless the water body also supports protected, native species such as California red-legged frogs. The Authority will attempt to trap non-native turtles and remove them in compliance with CDFW when they share habitat with protected, native species. Traps are designed specific to the target species and meant to capture the turtles without harm. Traps would be checked daily for release and documentation of any native species and removal of any non-native species. A qualified biologist determines if any native species are present in the trapping area and consults with CDFW and USFWS if special status species are present. In special cases, ponds are drained for sufficient time to collect and eliminate non-native amphibian species (in compliance with CDFW Code) and then refilled. See information on pond draining presented above for bullfrogs.

4.2.4 Feral Pigs

4.2.4.1 Background Information

Feral pigs (*Sus scofra*) are one of the most destructive wildlife species in California and continue to expand their range throughout the entire United States. Feral domestic and wild Eurasian pigs are not native to North America but have been introduced in multiple events. These wild pigs have hybridized to become unique, abundant invasive pests in California, and they are thought to be one of the most prolific large mammals on earth (West et al. 2009).

Any pig living unassisted in the wild in California is classified as a game animal by current CDFW Code, which regulates the sport harvest of game animals in California. Pigs have extremely generous allowable methods of sport take and can be harvested year-round in unlimited quantities with a hunting license and valid pig tag. Because they are also regulated as an agricultural pest in California by the USDA – APHIS Wildlife Damage Control Services and the CDFA, their management is often regulated by depredation permits from the CDFW. These permits can be obtained by private growers, ranchers, or other land owners and public agencies when proof of economic damage can be documented to the CDFW.

Pigs are mammals that are capable of extremely high reproductive rates when environmental conditions are favorable. In California's Coast Ranges, they can reach high population densities because of cool weather, year-round access to water, and food (including acorns, a favored food source) through the winter months. Their invasive potential is largely because of their ability to quickly increase population size; they reach sexual maturity at young ages, females can have multiple litters each year, and natural mortality rates are generally low with few native predators. They can also disperse over large distances to invade new habitats, preventing effective management on a local basis.

Pigs cause damage to California agriculture and native fish and wildlife. Their destructive rooting behavior is visible in many natural areas. Rooting increases erosion and soil sedimentation, decreases water quality, directly reduces native plant species (e.g., ingestion of tubers, acorns), and promotes the establishment of non-native and invasive plants in disturbed soils (Seward et al. 2004, Kotanen 1995). They also create competition for food resources that would normally be consumed by native wildlife (especially winter acorns), spread disease to wildlife, and consume ground nesting birds, reptiles, amphibians and small mammals (TNC 2009, Barrett 1982). Wild pigs are also estimated to cause $1.5 billion of crop damage annually through the direct consumption and damage to crops, transmission of disease to livestock, and other damages to property and agricultural infrastructure (USDA 2009).

4.2.4.2 Pest Management Strategies for Feral and Wild Pigs

The Authority would need to work with the California Department of Fish and Wildlife to develop a management program to capture feral pigs using baited traps and humane termination (shooting). Permitting would be arranged through an MOU for pig depredation across all properties or through a pig depredation permit on a case by case basis (Kasteen 2016). As part of the program, the Authority would coordinate with other regional land management agencies that are controlling feral pig populations.

4.2.4.2.1 Prevention

Exclusion of pigs with pig proof fencing can be effective in preventing high value areas from being invaded by pigs. Fencing must be maintained annually to be effective. Pig-proof fencing is usually very expensive to install and maintain, and also has the possibility of restricting the movement of native animal species. It is an effective strategy for protecting extremely high value natural areas, agricultural lands, or archeological sites in small areas.

4.2.4.2.2 Physical Control

- **Shooting.** Shooting (either hunting or professional depredation) is the most common method for feral pig control throughout California (CDFW 2013). Though state sport hunting is regulated in such a way to offer some control of pig populations, there can still be a population increase above target levels because pigs often change their behaviors to avoid hunting pressure. Permitted depredation hunting with the assistance of tracking dogs or using nighttime vision aids and thermal imaging can increase the effectiveness of managing populations. Shooting methods should only employ lead-free, copper-based ammunition to reduce non-target mortality to pig carcass scavengers. Shooting has limited public appeal in and near recreational facilities and may not be a practical option for the Authority in open preserves.

- **Trapping.** Trapping is the most effective means for regulating wild pig populations on a small landscape scale, although it must be done in perpetuity to maintain low population numbers. Cage- or corral-type traps are the most commonly used trap design in California. Snares have been found to be highly successful in Hawaii and Texas. Cage traps function by attracting single or multiple pigs into traps with bait through a one-way or guillotine trap door. Since pigs have large home ranges and they can disperse over large landscapes, effective trapping must focus on areas pigs are actively using. This requires the trapper to scout large landscapes or use a network of camera-traps to identify locations where pigs are actively travelling and feeding. Pre-baiting increases the effectiveness of live-catch traps. Trapping requires great effort and costs are typically high, but it is currently one of the most effective available methods for population control. All cage trap and snaring methods must be permitted through the CDFW on a project-by-project basis.

4.2.4.2.3 Chemical Control

- **Toxicants.** No toxicants are currently registered for the control of pigs, although some are in development for Federal registration through the EPA (Lapidge et al. 2012).
- **Contraception.** Currently, no immuno-contraceptives are registered for use on wild pigs although some are in development. The Wildlife Society considers wild pig contraception controls to be impractical in the field (Fagerstone et al. 2002), so they are likely not a viable treatment method for managing feral pigs on Authority lands.

4.2.5 Brown-headed Cowbird

4.2.5.1 Background Information

The brown-headed cowbird (*Molothrus aster*) are historically native from North Dakota to Oklahoma and south central Canada (Robinson et al. 1995). Due to the change in land use in the west with the loss of forests, increase in livestock grazing, agriculture, irrigation, and human development, the brown headed cowbird has expanded its range to almost all of North America (Rothstein 1994).

Female cowbirds lay their eggs in the nests of host species, allowing the host to incubate, hatch and raise the young cowbirds until they fledge. For smaller songbirds in particular, the larger cowbird chick outcompetes the smaller host chicks for food and will be the only chick to successfully fledge from the nest. Some songbird species, such as least Bell's vireo (*Vireo bellii pusillus*) which is federally and state listed as Endangered, are thought to have declined, in part, because of expansion of the cowbird breeding range (Rothstein 1994). The least Bell's vireo is especially susceptible to parasitism because the species will generally only raise a cowbird and none of their own.

The Authority does not currently control for brown-headed cowbirds but may do so in the future to help restore habitat for least Bell's vireo in the Pajaro River Agricultural Preserve. If any of the methods outlined below are selected, permits from CDFW and USFWS will be needed. CDFW does allow control of brown-headed cowbird to reduce nest parasitism on special status species through a special letter of authorization and a scientific collecting permit (Garcia 2016). USFWS should be contacted for information for federal permitting requirements.

4.2.5.2 Pest Management Strategies for Brown-headed Cowbird

4.2.5.2.1 Habitat Modification

Certain characteristics of vegetative structure can be beneficial in decreasing the vulnerability of host nests to parasitism. Dense vegetation at the nest level may help conceal nests. Management techniques that may achieve these qualities include planting seedlings, preventing overgrazing, and restricting areas from high recreation use (Siegle and Ahlers 2004).

4.2.5.2.2 Physical Control

- **Egg Removal/addling.** Removing cowbird eggs from the host nest or addling them by shaking can be used to limit cowbird impacts on hosts. These methods are cost effective and practical where small, remote populations of hosts and/or cowbirds exist. Addling may be preferable to removing eggs since some host species may desert their nest if eggs are removed (USFWS 2002a). However, if the host eggs have already been damaged it better for the host to desert this clutch and re-nest. Eggs can be removed using adhesive tape.

- **Trapping.** Trapping is the predominant method used for cowbird population control. Trapping efforts are typically highly successful in reducing local parasitism rates and can be a somewhat quick and easy cowbird control method (USFWS 2002a). Trapping requires daily monitoring in order to supply fresh water and food for captured birds and to release non-target species. It is generally assumed that trapping programs will continue for many years unless the target host species has increased markedly.

4.2.5.3 Chemical Control

Currently there is no feasible method of inhibiting breeding of large cowbird populations although DiazaCon looks like a promising compound, more research is needed (Siegle and Ahlers 2004).

4.2.6 Feral Pets

4.2.6.1 Background Information

As with non-native turtles, domestic animals are sometimes released by preserve visitors, or wander into preserves on their own. Some people feel ethically motivated to release captive pets and food animals back into natural environments for humane reasons or when they no longer wish to care for them. As a result, domestic cats, dogs, rabbits and other species end up living in preserves, and utilizing native rodents, plants, and insects for food.

4.2.6.2 Pest management Strategies for Feral Pet

4.2.6.2.1 Prevention

Education can be an important tool for the Authority in preventing pets from being intentionally released onto Authority lands. Public outreach and judiciously placed educational materials such as signs and brochures in Authority preserves may be a useful strategy to curb intentional releases of animals.

4.2.6.2.2 Live Capture

Utilize catch pole or otherwise trap dogs, cats, turtles, rabbits and other domesticated animals found escaped or released in the preserves and return them to their owners or turn them over to local animal control departments or animal shelters.

5 Guidance for Management of Invasive Pests in Agricultural Lands

5.1 Definition and Purpose

Some Authority lands encompass crop fields that are actively managed as agricultural operations. The Authority currently has one agricultural preserve with row crops (the Pajaro River Agricultural Preserve) and may acquire other agricultural properties in the future. A site-specific Agricultural Management Plan will be developed with tenants on each of the Authority's agricultural preserves. These site-specific plans will guide the agricultural activities to ensure compatibility with natural resource protection and low-intensity public recreation.

This Guidance Manual does not replace the requirements of the individual agricultural management plans, nor does it present the full range of agricultural options. These guidelines are to provide staff with tools and resources that are consistent with IPM principles to select the safest, least harmful, and most effective treatment options for agricultural pests.

The Authority has a separate grazing program and policy for rangelands that addresses how the Authority uses grazing as a management tool to conserve biodiversity while protecting water quality, cultural resources, scenic values, and recreational opportunities (SCOSA 2012). Therefore, management of rangelands is not included in this document. The Authority is administering an Urban Open Space Grant Program which could fund urban garden projects. Guidelines for the Urban Open Space Grant Program encourage sustainable materials, systems, and practices that enhance wildlife habitat and provide environmental benefits.

5.2 Agricultural Farms and Fields

The purpose of IPM on agricultural properties is to manage pests to maintain the specific land uses (e.g., crop production), while also providing natural resource protection and visitor access. Agricultural pests that may be encountered include weeds, pathogens and insects in croplands; and rodents in farm field and buildings.

The Pajaro River Agricultural Preserve is an agricultural preserve owned by the Authority and leased to a farmer. It contains row crops and fallow fields. The Authority is currently working on a restoration and agricultural management plan for the Preserve which will guide both the restoration and the compatible agricultural practices that will be incorporated in management of the Preserve. The Authority acquired agricultural lands in North Coyote Valley. Future uses and management of lands in Coyote Valley will be guided by the Coyote Valley master planning process, which will begin in 2021. As new agricultural lands are acquired, Authority staff will work with agricultural lessees to incorporate the procedures outlined in this Guidance Manual.

5.2.1 Types of Agricultural Pests

Insect, weed, and disease management in field crops is very specific to the type of crop grown. Because the Authority has only one property that currently supports row crops, and because the type of crop produced may change in the future, agricultural pest management is not covered under this Guidance Manual. Agricultural pest management will be would be covered in a future Agriculture Management Plan specific to each preserve. There are many resources available to help guide development of an Agricultural Management Plan, including best management practices as defined by the University of California Cooperative Extension Service and the USDA Natural Resources Conservation Science for farm production. The University of California Davis also publishes crop-specific IPM guidebooks for both organic and conventional crop production (http://www.ipm.ucdavis.edu).

5.2.1.1 Regulated Agricultural Pests

Though the definition of a pest can depend on perspective and location, some species are regulated as various types of pests by state and federal law. Plants classified as 'Noxious' are regulated by the California Department of Food and Agriculture (CDFA) and the United States Department of Agriculture (USDA). Wildlife species classified as 'Injurious' are regulated by the CDFW and United States Fish and Wildlife Service (USFWS). Other species that transmit diseases may be regulated by local, state, or federal health departments. Regulated pests pose a risk to the environment, public health, or economic resources. Often, the acceptable IPM tolerance level of regulated pests is zero, so that any detected individual initiates a management action. These are species that the Authority has a legal responsibility to control per state and federal laws and regulations, though control is often conducted by other agencies.

5.2.1.2 Pest Identification in Agricultural Farms and Fields

Due to the limited number of agricultural lands on Authority property, pest identification is the responsibility of the lessee, who is to report significant pest infestations to the Authority. Once pests are reported, they should be mapped and evaluated for impacts to the surrounding natural areas. Site-specific management needs will be determined by lessee and Authority in individual Agricultural Management Plans based on assessment of farm and field conditions, type of crops, and anticipated crop yields. See Table 16 below for pest management options.

5.2.2 Pest Management for Agricultural Farms and Fields

5.2.2.1 Prevention

The Authority will work with lessees to encourage management practices that prevent the establishment of pest species and include this information into individual Agriculture Management Plans. Prevention strategies for Authority lands in agricultural production may include:

- During development of new Agricultural Management Plans, encourage lessees to keep lands healthy through soil management, proper irrigation, and by providing sufficient habitat (refugia) for natural insect pest predators (natural enemies) in and near crop production areas.
- During development of new Agricultural Management Plans, and as practical, incorporate good stewardship practices such as rotational cropping, integrating annuals into perennial crops, implementing no-till cropping, and, where possible, promoting organic farming practices to reduce annual disturbance and increase farm biodiversity (Coll 2004).

- During acquisition planning for new preserve lands, encourage landscape mosaics (i.e., plan for a mixture of natural and agricultural or grazing lands) to help maintain natural pest predator populations.
- During lease renewal periods, monitor pest invasions at the edges of agricultural and grazing lands, especially in and near roads, trails, and fuel breaks. If needed, develop pest control requirements in the new lease.

Table 16: Pest management in agricultural lands

Pest Category	Treatment
Agricultural Insect Pests	Lessee to monitor insect damage of crops. Agriculture insect pest management to be addressed in future Agriculture Management Plans. Staff and tenants to consult crop-specific IPM guidebooks published by University of California Davis http://www.ipm.ucdavis.edu for both organic and conventional crop production and include pest management actions in the Agricultural Management Plan for individual parcels.
Rodents and Other Nuisance Pests in Agricultural Areas	Lessee to monitor rodent damage. In coordination with the Authority, lessee responsible for detection, Authority notification, and control of problem rodents in farm buildings or crop fields using procedures in the Section 6.
Invasive Plants in Agricultural Farms and Fields	**Cultural Control Options:** • Crop Rotation • Cover Crops and Smother Crops • Late-Season Planting • Planting Rates and Crop Density • Water and Nutrient Management • Crop Variety Selection • Covering/Soil Sterilization • Mulching • Soil Sterilization • Raptor posts **Physical Control Options:** • Mowing • Pulling • Green Flaming • Mulching • Use of Weedmats • Hoeing • Discing • Cultivating With Tractor Implements • Rodent Trapping • Burrow Destruction **Chemical Control Options:** To be determined by lessee and Authority in Agricultural Management Plans. Staff and tenants to consult crop-specific IPM guidebooks published by University of California Davis http://www.ipm.ucdavis.edu for both organic and conventional crop production and include pest management actions in the Agricultural Management Plan for individual parcels.

5.2.2.2 Treatment Options

Working with lessees, the Authority will determine a site-specific solution that meets the needs of the lessee, maintains the natural resource values, and addresses the identified pest issue. When feasible, non-chemical options are preferable to chemical options. Therefore, the Authority will encourage organic farming when developing individual Agricultural Management Plans with lessees. Structural pest issues on agricultural lands will be controlled using the same procedures outlined in Section 6.

Because the Authority has few properties that currently support row crops, and agricultural pest management is crop-specific, agriculture insect pest management for agricultural fields is not covered under this Guidance Manual. Staff and tenants should consult crop-specific IPM guidebooks published by University of California Davis – http://www.ipm.ucdavis.edu for both organic and conventional crop production and include pest management actions in the Agricultural Management Plan for individual parcels.

Cultural weed control methods/techniques include crop rotations, water and nutrient management, late-season planting, and cover/smoothing crops (Smith et al. 2000, Gunsolus et al. 2010). Cultural methods are the first line of defense in weed management and primary tools for organic crop production. The following lists the cultural methods as well as manual/mechanical control treatment options for invasive plants on agricultural lands:

- **Crop Rotation.** Diversifying a rotation is one of the most effective tools against weeds. Over time, routine planting and cultivation dates will select for weeds that are adapted to these strategies. Varying crops by different planting date or growing perennial crops in rotation with row crops can prevent weeds from adapting to the planting regimen.

- **Cover Crops and Smother Crops.** Off-season cover crops and smother crops are effective strategies to outcompete weeds. Cover crops occupy vacant space in an ordinarily fallow field and displace weeds that would otherwise occupy the space. Some species also have allelopathic effects on weeds.

- Smother crops are vigorously-growing crops that growers use to suppress weeds. Generally, a smother crop is not harvested, but plowed down instead. The primary risk in using smother crops is that their effectiveness in weed control may be inconsistent and unpredictable or they may become weeds themselves.

- **Late-Season Planting.** Delayed planting past the traditional planting times is an option in weed management, but depending on growing season and crop, may also reduce crop yields. Later season planting allows crop seedlings to bypass the competitive flush of weed seedlings and also allows for additional time for mechanical weed control operations.

- **Planting Rates and Crop Density.** Increasing the planting rate is another common strategy for weed management. Higher crop densities can lead to greater competitiveness against weeds. In addition, higher planting rates can compensate for crop losses that occur during mechanical weed control operations.

- **Water and Nutrient Management.** Effective water and nutrient management can ensure crops benefit from farming practices rather than weeds. Switching to drip irrigation from flood or broadcast styles, monitoring nutrient requirements instead of blanket fertilization, timing compost applications, and burying irrigation pipe may all help to reduce weed problems.

- **Crop Variety Selection**. Selecting the proper variety of a specific crop that is best adapted for local conditions can reduce the resources necessary for production and consequently reduce weed management problems. If the crop is better adapted to local conditions than the weed, the site will favor the crop over the weed.

- **Mechanical weed control.** Mechanical weed control is the most widely used weed control method for agriculture fields and can occur before, during, and after the crop is planted. This method includes primary tillage, row crop cultivating tillage, use of mulches (i.e., plastic sheeting, straw, wood chips, and sawdust), and/or soil sterilization techniques that use heat to kill weeds and weed seeds in soil. Passive sterilization uses clear plastic tarps to foster the germination of weeds under the tarp and then exposes the seedlings to hostile growing conditions and they perish and active sterilization uses extremely high temperature steam to eliminate weed seeds and bulbs with direct contact. Both processes are expensive and require specialized equipment and/or high labor output.

- **Primary Tillage.** Primary tillage is the initial step in seedbed preparation. It incorporates residues from the previous crop and can incorporate compost, manures, and other nutrients. It buries some weed seeds so deeply they cannot germinate, but it also brings other seeds to the surface allowing them greater opportunity for germination. Tillage is best combined with a forced germination program, where multiple tillage and watering events are coupled to force the germination of weeds and then eliminate them. The timing of primary tillage will encourage different weed species to predominate so the farmer must time the actions to correspond with the primary weed targets.

  A fundamental aspect to consider in seed bed preparation is the concept of providing the crop with an “even start.” An even start means controlling weeds that germinate before the crop germinates. Once seed bed preparation is complete, the crop must be planted as soon as possible because if crop planting is delayed, weeds can germinate and get a head start on the crop.

- **Cultivation.** Row crop cultivating tillage is performed after the crop is planted. Cultivation kills weeds by digging them out, burying them, breaking them apart, or drying them out. In addition to controlling weeds, cultivation can break up soil crusting and thus can increase crop emergence, water infiltration, mineralization of nutrients, and soil aeration during the growing cycle.

  A short window of time usually exists for timely use of cultivation. Weeds that emerge before or with the crop are the most critical to eliminate. Weeds that emerge after crop emergence will have less negative impact on yield, but may still contribute to the weed seed bank for problems in future years. When it comes to weeds that emerge with the crop, it is best to be proactive, rather than reactive. Waiting until weeds are noticeable will limit the control options.

- **Mulches**. Mulch is any artificial or natural soil cover. Plastic sheeting, straw, wood chips, and sawdust are all common types of mulches for crop production. Mulches work by eliminating light availability to small weeds. The larger the weed, the deeper the mulch needs to be for effective control. Mulches have the added benefit of also conserving soil moisture and reducing soil erosion. Many organic types of mulch ultimately decompose into necessary plant nutrients for the following growing season.

- **Sterilization.** Soil sterilization uses heat to kill weeds and weed seeds in soil. Two types are common in agriculture, 1) passive soil sterilization with clear plastic tarps and 2) active soil sterilization with injected steam. Passive sterilization uses clear plastic tarps to foster the germination of weeds under the tarp and then exposes the seedlings to hostile growing conditions and they perish. Active sterilization uses extremely high temperature steam to eliminate weed seeds and bulbs with direct contact. Both processes are expensive and require specialized equipment and/or high labor output.

- **Manual weed treatment.** Specific manual weed treatment methods include mowing, pulling, flaming, mowing, mulching, weedmats, and hoeing.

6 Guidance for Management of Pests in Structures

6.1 Introduction

Authority properties includes structures such as the administrative office located in San Jose, and numerous buildings such as barns, un-inhabited houses, and sheds in the preserves. Certain animals and plants may be incompatible with human use of these structures or may harm the building itself. For example, rodents, ants, and similar structural pest species are typically controlled in buildings when their population numbers may result in structural damage or health risks to humans.
The purpose of pest control in Authority buildings is to manage pests for human health and safety and preserve the intended uses of the building structure. Most structural pests only become problematic when there are extra resources readily available (food, water, shelter) in and around the structure. Many of these types of outbreaks can be managed with cultural options such as changing human behavior (e.g., securing garbage, cleaning up food) or engineered control options within structures (e.g., sealing up entrances to structure).

6.2 Prevention and General Maintenance

Modern IPM programs for buildings rely on prevention as the primary structural pest control treatment option to eliminate pest problems. Active pest control is used as a last resort. Use of control options such as physical barriers, materials selection, and site modifications provide the primary means to eliminate pests from buildings and other structures without needing to use pesticides or other lethal control. Table 17 summarizes prevention and maintenance practices that can reduce structural pests.

6.3 Prevention

Preventing insects and wildlife pests in buildings include general guidelines that promote pest-resistant materials, block common access points to buildings, and promote modifications of common structures to repel rather than attract common pests. These modifications may include changing the landscaping from dense cover to one does not provide hiding locations for small mammals. Prevention also includes modifying structures by preventing access to pests through cracks, crevices, gaps or holes. Pest control and building maintenance should also be considered when retrofitting existing buildings or designing new buildings. Design guidelines are available from the International Code Council/San Francisco Department of Environment (Geiger and Cox 2012).

6.4 Sanitation and Maintenance

Many pest species are attracted to food and are present due to improper handling and storage of food and food waste, or improperly cleaning up food scraps and dishes. Uncovered garbage containers can attract rats and other pests. Storing native plant seeds in paper envelopes rather than hard sealed plastic containers may encourage mice to take up residence in storage areas. These types of pest attractants can be eliminated with human behavioral modifications. Additional strategies to reduce or even eliminate pests in the Authority's office include:

- Store food and food wastes in sealed containers;
- Provide containers, sealed cabinets, or a refrigerator for temporary food storage;

- Do not leave food or food waste in an open area overnight;
- Regularly clean dishes, floors and countertops;
- Use sealed garbage cans, or place them on a crawling insect-proof platform; and
- Rinse out cans and bottles before they are placed in a recycling bin.

Table 17:Prevention and Maintenance Practices to Prevent and Reduce Structural Pests
Maintain landscaping next to structures
• Prune vines, shrubs, and trees at least six feet away from roofs and exterior walls to prevent rodents from using them for access into buildings
• Remove and avoid planting Algerian or English ivy, star jasmine, or honeysuckle vines, which provide shelter and food sources for rats and other pests.
• Remove and avoid planting bamboo, cherry laurel, fig, pine, and roses near buildings, which encourage scale, aphid, and ant populations.
• Clear landscaping away from vent openings to crawlspaces to prevent moisture buildup.
• Remove plants and wood mulch within several inches of foundations to minimize ants and other nests. A gravel strip around foundations at least two feet wide and 0.5 feet deep of one-inch gravel or larger discourages rodent burrowing and other insect nesting.
• Select plants that attract beneficial insects such as parasitic wasp, native bees, and ladybugs.
Move stored materials away from structures.
• Store compost and trash bins away from structures as these can attract rodents, insects, and other nuisance pests.
• Store woodpiles and debris away from structures to prevent rodent, beetle, and termite infestations.
Seal off openings.
• Inspect openings to crawlspaces and other ventilation features to ensure screens are intact.
• Inspect, maintain, and use elastomeric sealant, polyurethane foam, and weather-stripping to seal all small cracks in structures, around countertops and windows, pipe breaks, and areas where pipes enter walls. Use stainless steel wool and mesh and fire block foam to re-seal larger openings in buildings and below decks.
• Add door sweeps or high density pest brushes to seal gaps greater than ¼” below doors.
Block access for rodents to climb pipes and gutters.
• In areas with Norway rats or other rodent issues, various items can be installed to prevent the rodents from climbing downspouts and pipes, including flap valves or screens in downspouts, 12”-diameter downward-facing cones or 18”-diameter discs, or a 12” band of glossy paint on exterior vertical pipes.
Reduce or move exterior lighting to prevent insects from gathering near doors and windows.
• Timers and motion detectors can be installed to minimize unnecessary lighting.
• Use reflected light instead of direct light to illuminate entryways, as insects are more attracted to direct light.
• Use yellow (sodium) bulbs to reduce insect attraction in exterior areas.
Add bird exclusion materials to lighting and other horizontal surfaces.
• Bird spikes, wires, netting, or similar materials can be installed to prevent unwanted birds from roosting or nesting on structures or on light poles.
Minimize moisture in and near structures.
• Check for proper ventilation of crawl spaces; add vapor barriers in crawl spaces.
• Ensure appropriate slopes and drainage next to structures.

Table 17:Prevention and Maintenance Practices to Prevent and Reduce Structural Pests

- Downspouts and gutters should discharge at least one foot away from walls; splash guards, rain barrels, or gutter extensions may be added to reduce accumulation of moisture near structural walls.
- Ensure that landscape irrigation does not introduce moisture to foundations – use drip irrigation and position sprinklers to avoid structures.

Exclude rodents from refuse and recycling areas.

- Enclose refuse and recycling areas with metal, concrete, or similar materials to prevent animals from climbing, burrowing, or chewing into the enclosure. Do not plant ivy around enclosure.
- Use refuse containers that are heavy duty, rust resistant, rate and damage resistant, and equipped with tight-fitting lids.

Recommendations are from the MROSD IPM Guidance Manual which were selected from the Pest Prevention By Design: Authoritative guidelines for designing pests out of structures (Geiger and Cox 2012).

The Authority's structures also include storage buildings or livestock infrastructure on Authority preserves. These additional measures may be applied in these type of structures:

- Store all pet food, animal grains, and other consumable agricultural supplies in sealed containers.
- Store plant seeds used for habitat restoration and landscaping in sealed containers.
- Monitor landscaping and rooted plant materials for pests, and treat as necessary to prevent pest outbreaks.
- Position attractive harborage areas, such as rock piles, soil storage piles, hay and erosion control materials away from buildings.
- Control food waste in work areas, outbuildings, storage areas, and other non-occupied structures. Provide sealed garbage containers in or near such areas.
- Reduce, monitor, and where possible eliminate use and import of natural materials that could introduce pests onto Authority lands such as reducing use of offsite fill (soil, gravel, and rock) and livestock feeds (hay) that may contain weed seeds. Where possible, include requirements to utilizes onsite fill, require balanced cut and fill projects, and require use of certified weed-free erosion control materials for construction projects on Authority lands.

6.5 Pest Control Treatment

Despite efforts to prevent pests from becoming a nuisance, pests may still establish themselves in Authority buildings, requiring more active pest control. Pest management options should begin with natural pest controls (such as diatomaceous earth) before using more harmful products unless there is an immediate threat to human health or safety. Strategies for some pests must use a variety of different techniques to avoid problems with pesticide resistance. Each situation will be assessed by Authority staff based on the pest, level of threat, and location.

6.5.1 Ants

6.5.1.1 Background Information

Argentine ants (*Iridomyrmex humilis*) are the most common nuisance ant species likely to be encountered in Authority structures. The Argentine ant is a non-native species from South America that likely arrived in California in the early 1900s. Argentine ants have four life stages: egg, larva, pupa (cocoon), and adult. They are social insects that live in organized colonies where different adults have specialized duties and numerous queens and workers mix freely among spatially separated nests. Unlike native ants, Argentine ants mix freely between colonies without intraspecific competition and can therefore reach high population densities compared to native ant species (Silverman and Brightwell 2008). For this reason, eradication of Argentine ant populations is impossible; if a sub-colony collapses, other nearby queens will shift to fill the void. Argentine ants are omnivorous, preferring high protein sources until those researches are exhausted and then shifting to plant and nectar based resources. They are especially fond of honeydew produced by Homopteran insects (e.g., aphids) and the pest problems of each of these species in gardens and structures are often linked.

6.5.1.2 Pest Management Strategies for Ants

6.5.1.2.1 Prevention

- Clean all kitchen and food storage surfaces regularly; sweep and vacuum kitchen floors daily. Shared-use appliances such as sinks, microwaves, and vending machines should be cleaned regularly to eliminate spills.
- Store all food properly in containers with tight fitting lids, or in the refrigerator or freezer.
- Rinse recycling waste if temporarily stored in open bins, or store waste in containers with tight fitting lids/seals or place open bins on insect-proof bases. Always line trash bins with plastic bags and regularly take out garbage to an outside storage area/dumpster.
- Do not leave pet food in bowls overnight. Wash pet food bowls after the pet is done eating.
- Inspect potted plants for nests regularly. If ant nests are found, remove the potted plant. If potted plants become a frequent harborage for ant nests, use ant-proof platforms (e.g., Antser™) or use a double saucer system for potted plants. Flooding the pot for several days can treat ant-infested potted plants.
- Inspect landscaping for aphids, scale, and other honeydew producing insects. If found, treat plants for insect pests, and manage ants in a coordinated effort to eliminate both problems.

6.5.1.2.2 Physical Control

- Clean up ant trails when found with soapy water or sticky lint rollers. Note the location the ants were headed and where they were coming from. If possible, clean-up what was attracting the ants.
- Use caulking, silicone, or expanding foam to fill cracks, holes, or other entry points where ant trails originate. If multiple entry points are suspected, inject diatomaceous earth dust into cracks before sealing.
- Prune outside vegetation that is touching the structure if it supports ants, aphids, or scale. Some species, such as Citrus, are especially vulnerable to sucking Homopteran insects that attract ants. Consider replacing these species of plants with species that do not attract Homopteran pests. Treat infected vegetation by spraying with soapy water or insecticidal soap sprays, dusting with diatomaceous earth, or physically removing insects.

6.5.1.2.3 Chemical Control

Chemical control of ants includes two options: 1) direct control using sprays for instant, but temporary knockdown of individual ants and the treatment of Homopteran pests that attract ants, and 2) baits for colony control. Sweet liquid baits are useful throughout the year because adult Argentine ants only feed on sugary liquids. High protein baits are generally only useful to treat colonies during the periods of the year when they are actively expanding because such solid food is typically used by the ants to feed larvae. Baiting is generally a slower process than direct control but it has a much greater long term impact on controlling the entire local colony. Baits are taken back to feed larvae and shared with other adults and queens so they potentially can eliminate the entire colony rather than just a few individuals. Modern baits are designed to be extremely host- specific compared to generalist insect sprays. Baits target the pest directly, rather than being applied to the environment. Never use direct control (spray) around a bait station, as the spray will impede the bait's ability to attract the insects. Baits will only be used indoors in tamper-proof stations.

For the control of insects, multiple baits with different modes of action are recommended to prevent local populations from developing resistance to the pesticides. Every structural insect management program should include a few products to use in rotation to prevent resistance.

- **Insecticidal Soap Spray.** Insecticidal soaps are specially designed mixes of fatty acids that are made to penetrate an insect's covering and dissolve its cell membranes causing dehydration and mortality. Generally, the soaps are formulated to not dissolve plant cell membranes so are safe to apply directly to plants. Insecticidal soaps are not effective on all insects, but soft bodied insects, such as Homopterans, are highly susceptible. When used for ant control, soaps are most effective in controlling the Homopteran insects on plants that attract and sustain ant colonies.
- **Boric Acid Bait.** Boric acid is a naturally occurring compound found in many fruits and vegetables, but at concentrated doses it can be an effective stomach poison for insects. Baits use low concentrations of boric acid – sodium tetraborate decahydrate – in the range of 0.5 – 5% to allow for ants to ingest the bait and take it back to the colony to share with other workers before there is a lethal effect. Higher concentrations risk killing the individual before it has time

to take the bait back to the colony. Studies show that the lowest concentrations (<1%) are optimum for Argentine ant preference (Klotz 2000).

- **Fipronil.** Fipronil is a broad-spectrum insecticide common in household cockroach/ant baits and flea sprays for pets. When used as an ant bait, it is toxic to insects through ingestion where it blocks chloride channels in the central nervous system; resulting in excess neuronal stimulation and death of the target insect pest. It has higher binding affinity in insect receptor sites versus mammalian receptors so it is considered highly selective for insects and safe to use in human environments (Jackson et al. 2009). It is considered one of the most effective baits for colony control of Argentine ants in situations when boric acid-based baits are less effective (Hooper-Bui and Rust 2000, Mathieson et al. 2012). Fipronil is relatively quick-acting compared to other natural pesticides. It should be used as a last-resort option when extremely high populations of ants must be controlled quickly. Only small amounts of bait are necessary to control ants compared to knockdown sprays, which must be applied more widely in the environment to be effective. Small amounts of fipronil will be used as a last-resort option when extremely high populations of ants must be controlled quickly.
- **Diatomaceous Earth.** Diatomaceous earth (DE) is a silica-based, naturally occurring mineral product that works as a generalist insect pesticide. It is composed of the fossilized silica cases of marine diatoms that have been mined from ancient marine sediments. The dusts are considered non-toxic although care should be taken to not inhale large amounts of dust during application as all mineral and wood dusts are considered hazardous in extremely large amounts. Food-grade DE is available to mix directly in human and pet foods to manage pests that occur in bulk food storage. DE works by mechanically abrading an insect's exoskeleton that leads to dehydration and eventual death of the insect. DE is non-selective so it must be used only in specific areas where the target pests travel. The dusts are not eaten – so must be applied in areas where they will make contact with the bodies of insect pests. For ant control, it is often applied to cracks and crevices and may also be used in conjunction with caulks and foams to fill problem areas.

6.5.2 Cockrocaches

6.5.2.1 Background

One of the most common structural nuisance insect pests in North America is the cockroach (Olkowski et al. 1991). Though rarely carrying disease or causing major economic damage to our structures, it is typically considered unacceptable in our homes and workplaces; triggering psychological distress, embarrassment, and general feelings of disgust. Cockroaches do consume human foodstuffs and wastes, and can contaminate them with saliva and excrement. In some cases, they carry disease and may be linked to increased asthma rates (CDC 2013a).

Cockroaches are scavengers of plant materials; as a result, they prefer carbohydrates over fats and proteins. They consume any human food or food waste that contains significant carbohydrates in addition to materials such as pastes, glues, and soaps. Most common cockroach species can only exist in high humidity and high temperature environments such as those present in human structures.

Several different species of cockroaches occur as pests in Northern California and each has separate behaviors and habitat preferences that dictate different types of pest management. The non-native

German cockroach (*Blatella germanica*) is the smallest and most widely spread pest cockroach in North America. It has three life stages: egg, nymph, and adult. German cockroaches prefer dark, warm, and humid hiding places and they are common in basements, kitchens, and bathrooms. They are thigmotactic, meaning they prefer to rest in small cracks where their stomach and back touches surfaces during most of the day, so regular inspection of crack areas can sometimes aid in cockroach detection in buildings. Unlike ants, they are solitary insects but since preferred habitats are rare in buildings, it is common to find large numbers of cockroaches hiding in the same general areas. German cockroaches are ubiquitous in human environments that occur in temperate climates so complete pest eradication is almost never achievable. Cockroaches regularly disperse in cartons, boxes and other containers coming to and from grocery stores, warehouses, flower shops, and other shipments, and are thus are likely to always be present in human environments. Strategies such as sealing exterior cracks/holes in buildings and strict sanitation measures both inside and out of buildings will help maintain their populations at nearly indiscernible levels which should be sufficient for most Authority properties.

6.5.2.2 Pest Management Strategies for Cockroaches

6.5.2.2.1 Prevention

- Clean all kitchen and food storage surfaces regularly; sweep and vacuum kitchen floors daily. Shared-use appliances such as sinks, microwaves, and vending machines should be cleaned regularly to eliminate spills.
- Store all food properly. Store all food in containers with tight-fitting lids, or in the refrigerator or freezer.
- Rinse recycling waste if it is temporarily stored in open bins. Alternatively, store all waste in containers with tight fitting lids/seals or place open bins on insect-proof bases (Antser™ bases) and always line trash bins with plastic bags. Regularly take out the garbage to an outside storage area/dumpster.
- Do not leave pet food in open bowls overnight. Wash pet food bowls after the pet is done eating.
- Ensure all exterior windows that open have insect screens to prevent roaches from gaining entry into structures.

6.5.2.2.2 Physical Control

- Use caulking, silicone, or expanding foam to fill cracks, holes, or other entry points where cockroaches are known to hide or enter structures. If multiple entry points are suspected, inject diatomaceous earth dust into cracks before sealing.
- If hiding places are unknown, use a sticky-trap monitoring program to determine where in the building roaches are hiding.

6.5.2.2.3 Chemical Control

Only baits in tamper-proof stations will be used indoors; these chemical control options are described below.

- **Diatomaceous Earth.** DE is a silica-based, naturally occurring mineral product that works as a generalist insect pesticide. It is composed of the fossilized silica cases of marine diatoms that have been mined from ancient marine sediments. The dusts are considered non-toxic although care should be taken to not inhale large amounts of dust during application as all mineral and wood dusts are considered hazardous in extremely large amounts. Food-grade DE is available to mix directly in human and pet foods to manage pests that occur in bulk food storage. DE works by mechanically abrading an insect's exoskeleton that leads to dehydration and eventual death of the insect. DE is non-selective so it must be used only in specific areas where the target pests travel. The dusts are not eaten – so must be applied in areas where they will make contact with the bodies of insect pests. For cockroach control, they are often applied to cracks and crevices and may also be used in conjunction with caulks and foams to fill problem areas.
- **Boric Acid Dusts.** Boric acid is a naturally occurring compound found in many fruits and vegetables, but in concentrated doses, can be an effective stomach poison for insects. Boric acid dusts are highly effective for cockroach control when applied to cracks and crevices where cockroaches are known to occur. The dusts (when kept dry) have a long service life and provide control for many years after application. They are practically non-detectible to cockroaches, so unlike many other chemical products that cockroaches can detect and avoid, they offer one of the more effective methods for cockroach control (Gore and Schal 2004). Since they have such a long service life, they are effectively applied inside building walls, plenum (false) ceilings, crawlspaces and other relatively inaccessible areas where cockroaches can occur. Boric acid dusts are relatively slow acting compounds that take up to 10 to 15 days to achieve effective elimination of problem insects so they should generally be used in compliment with a baiting program to achieve full control of cockroach outbreaks.
- **Hydroprene.** Hydroprene is a synthetic insect growth regulator (IGR) that mimics juvenile insect hormones to regulate insect pest populations. Although they do not poison an insect directly to cause a lethal effect, they do interrupt the development cycle of juvenile cockroaches so they do not ever reach a reproductive stage. This mode of action can be important to reducing adult populations by preventing young insects from reaching adulthood and breeding in a long term control strategy. For this same reason, hydroprene is considered highly specific to insect pests and has low toxicity for birds and mammals, species that do not possess these same types of growth hormones. IGRs are not an ideal stand-alone control, but they are effective when used in combination with other methods to reduce populations of troublesome insects.
- **Fipronil insecticidal baits.** Fipronil is a relatively recently developed, broad-spectrum insecticide common in household cockroach/ant baits and flea sprays for pets. When used as cockroach bait, it is toxic to insects through ingestion where it blocks chloride channels in the central nervous system. This results in excess neuronal stimulation and death of the target insect pest. It has higher binding affinity in insect receptor sites versus mammalian receptors so it is considered highly selective for insects and safe to use in human environments

(Jackson et al. 2009). Fipronil is relatively quick acting compared to other natural pesticides. It should be used as a last-resort option when extremely high populations of cockroaches must be controlled quickly. As it is insecticidal bait, only small amounts of bait are necessary to control cockroaches effectively compared to knockdown sprays that must be applied much more widely in the environment.

- **Indoxacarb insecticidal baits.** Indoxacarb is a synthetic, non-systemic insecticide effective on chewing and sucking insects. When used as cockroach bait, it is toxic to insects through ingestion where it blocks sodium channels in the central nervous system resulting in paralysis and elimination of the target insect pest. It replaces more hazardous organophosphate insecticides while still providing a fast acting, quick knockdown pest control option. Indoxacarb is a quick acting insecticide and offers exceptional German cockroach control potential. In laboratory conditions, small amounts of gel baits can provide several generations of control when the product is re-consumed through feces, regurgitates, and through bodily contact from the primary exposed individual cockroach (Buczkowski et al. 2008). This product is recommended for last-resort options in challenging cockroach pest control scenarios.

6.5.3 Flies

6.5.3.1 Background

Flying insect pests such as flies can be problematic inside buildings. In our region, the most common pest fly species, also referred to as filth flies, are common house, stable, and greenbottle flies (Calliphoridae and Muscidae families). Common houseflies and greenbottle flies tend to be the most problematic groups of filth flies that cause pest problems in buildings and other public spaces. The presence of filth flies is generally indicative of unsanitary conditions, which makes them undesirable. They can also carry disease pathogens to humans through feces and regurgitation.

Pest flies breed in animal wastes and decaying organic material from which they can pick up bacteria and viruses that may cause human diseases. In addition, adult stable flies feed on mammalian (livestock) blood and can offer a painful bite. All flies undergo complete metamorphosis with egg, larva, pupa, and adult stages in their development. The female fly deposits her eggs in animal waste or moist organic material where the larvae, or "maggots," complete their development, feeding on wastes until they pupate in a dry location.

6.5.3.2 Pest Management Strategies for Filth Flies

6.5.3.2.1 Prevention

- Clean all kitchen and food storage surfaces regularly; sweep and vacuum kitchen floors daily. Shared use items such as sinks, microwaves, and vending machines should be cleaned regularly to eliminate spills.
- Store all food properly. Store all food in containers with tight fitting lids, or in the refrigerator or freezer.

- Rinse recycling waste if it is temporarily stored in open bins. Alternatively, store all waste in containers with tight fitting lids/seals or place open bins on insect-proof bases (AntserTM bases) and always line trash bins with plastic bags. Regularly take out the garbage to an outside storage area/dumpster.
- Ensure outside garbage cans and dumpsters have tight-fitting lids to prevent flies from completing their life-cycles in waste cans.
- If garbage cans do not have tight fitting lids, use cedar sawdust to layer over wet/organic waste in the trash bins to prevent flies from accessing food waste.
- Clean trash bins regularly with pressure washer or soap/water to ensure no thick layers of organic wastes build up in the bottom of cans.
- Ensure all exterior windows that open have tight-fitting insect screens to prevent flies from gaining entry from outside.
- For stables and other enclosed livestock areas, remove animal wastes on a regular basis and dispose in sealed containers or in managed compost piles.

6.5.3.2.2 Physical Control

- Use caulking, silicone, or expanding foam to fill cracks, holes, or other entry points in building exteriors where flies can gain entry.
- In problem areas, use sticky fly traps (ribbons) to capture excess adult flies and remove them from building interiors.
- Use baited electric traps for problem outside areas such as picnic grounds, barns, or livestock areas.

6.5.3.2.3 Chemical Control

In most residential and commercial situations, pesticides are not needed or recommended for control of flies, as they are not effective. Sanitation methods along with screens to keep flies out of buildings should be sufficient for nuisance fly control outside of agricultural facilities with livestock. Fly traps and strips used in problem trash areas may be effective in reducing the number of adult flies if proper sanitation practices are followed.

6.5.4 Mice

6.5.4.1 Background

The house mouse (*Mus musculus*) and deer mouse (*Peromyscus* sp.) are both small rodents that readily invade human structures in search of shelter and food. The house mouse is a widespread species that has been linked to human culture for over 1,000 years (Timm 1994). It is now found on every continent except Antarctica. Deer mice are native to California and most other parts of North America. They are common in nearly every habitat in their range – from deserts to forests and also in urban and suburban areas that interface with natural areas.

Both types of mice are omnivorous but generally prefer grain, seeds, and nuts. Both are nocturnal, have similar reproductive traits and reside in nests composed of fibrous materials. All mice species that are considered pests are capable of extremely high reproductive rates anytime during the year, making control difficult. House mice are rather plain looking versus deer mice that have light/dark fur color schemes, white feet, large eyes, and large ears.

Mouse damage includes the consumption of human foods, building nests in human structures, defecation, physical gnawing, damage to paper, clothing and other textiles and the vectoring of disease. House mice are known to carry salmonellosis, leptospirosis, and a variety of other diseases but transmission to humans is rare.

6.5.4.2 Pest Management Strategies for Mice

6.5.4.2.1 Prevention

- Ensure outside garbage cans and dumpsters have tight-fitting lids to prevent mice from foraging on human food waste. This is especially important in public gathering areas in parks and open spaces. Cans with domed lids and self-closing, hinged lids are preferred in these outside areas.
- Clean all kitchen and food storage surfaces regularly; sweep and vacuum kitchen floors daily. Shared use items such as sinks, microwaves, and vending machines should be cleaned regularly to eliminate spills.
- Store all food properly, in containers with tight fitting lids, or in the refrigerator or freezer.
- Store native seeds, hay, and other vegetation-based materials that can attract mice properly in sealed containers or designated sealed storage facilities.
- Do not leave pet food in open bowls overnight. Wash pet food bowls immediately after feeding.

6.5.4.2.2 Habitat Modification

- Use silicone caulking and stainless steel/bronze mesh to plug/fill cracks and holes greater than ¼” in the exterior of building where mice could gain entry. Focus especially on utility penetrations, as mice are known to travel along pipes/wires. Avoid using carbon steel wools and expandable foams that degrade quickly and require repeat maintenance.
- Ensure all exterior windows that open have tight-fitting insect screens to prevent mice from gaining entry from the outside when windows are opened.
- Use galvanized sheet metal to create climbing barriers and exclude mice from travelling up vertical posts where necessary (pet cages/food storage tables/etc.).
- Mouse-proof storage facilities and seasonal buildings after visitor season ends to reduce possible nesting areas.

6.5.4.2.3 Physical Control

- **Snap Traps.** Basic hardware store mouse traps offer one of the most effective means for mouse population control when executed with enough preparation, time, and effort. When uncontrolled mouse populations are present, snap traps can be used to "knockdown" large populations and then maintained to keep the population under control. Mice generally travel very short distances throughout their life – space traps approximately every six feet where mice are active. Time must be invested in determining where mice are active and then setting traps in appropriate locations. Pre-baiting will help prevent trap shyness and allow for the operator to test appropriate baits. Only highly desired baits should be used in the actual trapping program. Most mice species are not as trap shy as roof and Norway rats.
- **Box Traps.** Several types of box traps are available that are capable of trapping multiple individual mice per trapping event. These traps operate on the principal that mice are attracted to small openings and are naturally inquisitive. These traps are most successful for house mouse control. Traps should be inspected on a daily basis so live trapped mice can be humanely dispatched.

6.5.4.2.4 Chemical Control

Chemical control of mice should not be considered except under very unusual (human health and safety considerations). In the unlikely event that chemical control of mice is deemed necessary, refer to the Chemical Control sections for rats, below.

6.5.5 Roof, Norway, and Wood Rats

6.5.5.1 Background

Roof rat (*Rattus rattus*), Norway rat (*Rattus norvegicus*), and Dusky-footed woodrat (*Neotoma fuscipes*) are medium sized rodents that readily invade human structures in search of shelter and food. With the exception of the native woodrat, rats represent some of the most challenging pest rodents to control in urban environments (Marsh 1994). Roof and Norway rats can be present in very large numbers in urban areas. Their home ranges are much larger than those of mice so effective treatment is challenging and may require treatment of more than a single structure. Both the roof and Norway rat are a widespread pest species that have co-evolved with humans for thousands of years.

Dusky-footed woodrats are native California mammals that are occasionally considered pests when they invade structures from nearby wildlands. All woodrats found on Authority lands are the San Francisco Dusky-footed woodrat (*Neotoma fuscipes annectens*) which is a CDFW Species of Special Concern. Control of woodrats, as with all native species, should first focus on prevention instead of physical or chemical control.

Like cockroaches, rats trigger general feelings of disgust in humans as they are thought to be representative of dirty living conditions and squalor. They do bite, and many people in the U.S. suffer from rat bites each year. Rats are known to carry diseases that can be transmitted to humans. The majority of actual rat damage in the United States is due to structural damages caused by burrowing (Norway rats), defecation and contamination of food products, textiles and living spaces (Norway/roof/wood rats), and damage to agricultural crops and landscaping (roof rats). Woodrats typically build elaborate nests in wildland areas, but can also be nuisance pests in structures where they make nests and cache food.

6.5.5.2 Pest Management Strategies for Rats

6.5.5.2.1 Prevention

- Ensure outside garbage cans and dumpsters have tight-fitting lids to prevent rats from foraging on human food waste. This is especially important in public gathering areas in parks and open spaces. Cans with domed lids and self-closing, hinged lids are preferred in these outside areas.
- Clean all kitchen and food storage surfaces regularly; sweep and vacuum kitchen floors daily. Shared use items such as sinks, microwaves, and vending machines should be cleaned regularly to eliminate spills.
- Store all food properly, in containers with tight fitting lids, or in the refrigerator or freezer.
- Do not leave pet food in open bowls overnight. Wash pet food bowls immediately after feeding.

6.5.5.2.2 Habitat Modification

- Inspect building exterior for possible rodent entryways. Especially inspect attics for signs of rat occupation and openings or gaps between the structure and roofs or foundations. Use silicone caulking and stainless steel/bronze mesh to plug/fill cracks and holes greater than ½" in the exterior of building where rats could gain entry. Focus especially on areas where utilities enter the buildings, as rats are known to travel along pipes/wires. Avoid using carbon steel wools and expandable foams that degrade quickly and require repeated maintenance.
- Ensure all exterior windows that open have tight-fitting insect screens to prevent rats from gaining entry from the outside when windows are opened.
- Use galvanized sheet metal to create climbing barriers and exclude rats from travelling up vertical posts where necessary (e.g., utility poles, pet cages, food storage areas, tables).
- Rodent-proof storage facilities and seasonal buildings after visitor use season ends to reduce possible nesting areas.
- If they appear to be a constant source of infestation, woodrat nests within 100 feet of buildings will be moved after consultation with the California Department of Fish and Wildlife.

6.5.5.2.3 Physical Control

Basic hardware store rat traps offer one of the most effective means for rat population control in small structures with small rodent populations. Where large rat populations are present, snap traps can be used to "knock down" the population size in conjunction with other management techniques (prevention, habitat modification) to keep the population under control. Time must be invested in determining where rats are active and then setting traps in appropriate locations. Roof and Norway rats are inherently wary of new objects in their environment, including rat traps. Pre-baiting is essential to allow rats to associate rat traps with feeding stations, a process that may take several weeks. Only after rats have become used to traps should the trapping portion of the control effort move forward.

6.5.5.2.4 Chemical Control

The Authority is aware of the potential for secondary effects of rodenticide use in and near natural lands on native wildlife species and currently does not use rodenticide on its lands. If a future situation occurs where rodent infestations are determined to present a public health issue, the Authority will use all non-chemical control options before selecting rodenticides as a treatment option, except in instances where rodent infestations are determined to present a public health issue. The following section carefully lays out the effects and limitations of each type of rodenticide product and provides guidance for staff selection of the least toxic effective treatment option in the event that chemical control of rodents must be utilized.

Primary versus Secondary Poisoning. Non-target poisoning is divided into two scenarios: 1) a non-target animal intercepts the bait – referred to as "primary exposure"; and 2) a non-target animal ingests a prey species that has been exposed to the toxicant – referred to as "secondary exposure." Rodenticides typically have high degrees of mammalian toxicity compared to other types of pesticides so it is important to control how these compounds are presented to target rodent pests. Acute toxicant baits can attract non-target mammals and birds so these baits must be presented in environments where only rodents have a chance of encountering them.

Sealed box bait stations are now common for nearly all rodent baits used in structures to prevent pets and people from encountering the baits. Bait stations are usually designed for urban environments and they offer little protection to stronger wildlife species such as raccoons, badgers and bears that can easily open them (Erickson and Urban 2004). To better protect non-target wildlife species in the urban-wildlife interface, custom protective devices can be installed to shield bait stations from non-target wildlife species. Because predators generally prefer to catch and eat live prey, acute toxicants (the products that work quickly on the target animal resulting in a quick mortality) rarely cause secondary exposures to predators and scavengers.

Acute Rodenticide – Cholecalciferol (Vitamin D3). Cholecalciferol is a natural form of Vitamin D that is industrially synthesized from lanolin (sheep's wool) to produce human dietary supplements and rodent poison. In very high doses, it causes mobilization of calcium from the bone matrix to blood plasma, causing hypercalcemia and death. It is especially toxic to rodents and a single dose of toxicant acts as an acute poison. It is the only current rodenticide in California labeled for organic food production (OMRI 2013). Cholecalciferol is considered a novel mode of action for rodenticides and can be used in urban areas where rodents have developed resistance to other anticoagulants (Marshall 1984). It is considered a low risk for secondary poisoning in wildlife but can be a hazard to non-target pets that directly consume the bait. Rodenticides will only be used inside in tamper-proof anchored containers.

6.5.6 Skunks, opossums and raccoons

Skunks, opossums, and raccoons are native mammals that have the potential to take residence in Authority structures as unwelcome guests. All these species are extremely common on Authority lands and generally will not bother humans. On rare occasions, they may invade trash cans, open kitchens, or den under and within structures. CDFW regulates these species as nongame or furbearer animals so they all may be controlled without permits if found causing agricultural damage or nuisance problems.

6.5.6.1 Prevention

- Ensure outside garbage cans and dumpsters have tight-fitting lids to prevent foraging on human wastes. This is especially important in public gathering areas in parks and open spaces. Cans with domed lids and self-closing, hinged lids are preferred in these outside areas.
- Clean all kitchen and food storage surfaces regularly; sweep and vacuum kitchen floors daily. Shared use items such as sinks, microwaves, and vending machines should be cleaned regularly to eliminate spills.
- Do not leave pet food in open bowls overnight. Wash pet food bowls immediately after feeding.

6.5.6.2 Habitat Modification

- Use stainless steel/bronze mesh or welded wire to plug/fill cracks and holes in the exterior of building where large animals could gain entry.
- For larger openings, such as under decks and porches, fully enclose with plywood, concrete or wire mesh to prevent animals from making dens under structures. If animals are already denning in the areas, use one-way, hinged doors to allow them out but preventing them from returning. Confirm there are no juvenile animals in the den before using one-way doors.
- For raccoons in challenging areas, a single electrified strand of wire elevated eight inches from the ground can be used to deter them entering the area.

6.5.6.3 Physical Control

All skunks, opossum, and raccoons are easily trapped with live box or cage traps. Trap design varies but solid wall traps are preferred for skunks to shield the trapper from skunk spray during the control operation. The use of live trapping methods ensures that non-target animals can be released unharmed. Current CDFW trapping regulations requires that trapped animals are either released immediately or euthanized, live animals may not be relocated without a permit from CDFW.

6.5.6.4 Chemical Control

Currently there are no toxicants or fertility control agents available in California for these species.

6.5.7 Ground Squirrels

California ground squirrel (*Spermophilus beecheyi*) is a species native to California. Although it is native, it is not a protected species. These animals can become a pest when they burrow under structures. Burrows can cause damage to the foundation of a building and to footpaths and roadways by undermining them. They can also harbor diseases harmful to humans, particularly when squirrel populations are numerous, including bubonic plague which is transmitted to humans by fleas that the squirrels carry.

The California Fish and Game Code classifies ground squirrels as nongame mammals. An owner or tenant can control, in any legal manner, nongame mammals that are injuring growing crops or other property; tree squirrels, on the other hand, are classified as game animals and have a hunting season and require a permit by CDFW. The Authority does not control tree squirrels and does not intend to.

6.5.7.1 Prevention

- Ensure outside garbage cans and dumpsters have tight-fitting lids to prevent foraging on human wastes. This is especially important in public gathering areas in parks and open spaces. Cans with domed lids and self- closing, hinged lids are preferred in these outside areas.
- Clean all kitchen and food storage surfaces regularly; sweep and vacuum kitchen floors daily. Shared use items such as sinks, microwaves, and vending machines should be cleaned regularly to eliminate spills.
- Do not leave pet food in open bowls overnight. Wash pet food bowls immediately after feeding.
- Do not actively feed squirrels near buildings or on Authority preserves.

6.5.7.2 Habitat Modification

- Remove brush piles and debris and keep breezeways of barns clear of material.
- Exclude ground squirrels from digging under a building by installing a curtain wall of concrete.

6.5.7.3 Physical Control

Ground squirrels may be trapped using multi-catch live traps in structures and removed. This could be followed by exclusion to keep the ground squirrels out of the structure.

6.5.7.4 Chemical control

Chemical control of ground squirrels should not be considered except under very unusual circumstances (human health and safety considerations). The Authority does not currently use rodenticides and would only use it in the future as a last resort. In the unlikely event that chemical control of ground squirrels is deemed necessary, Authority staff would consult with experts to deem the least harmful and most appropriate method of control. If new chemicals are available, these would be evaluated on a case by case basis. Some resources include http://www.groundsquirrelbmp.com/ and http://ipm.ucanr.edu/.

6.5.8 Bats

Bats are California’s only flying mammal. There are a wide variety of bats (more than 16 species in all) that inhabit all habitats in the Bay Area; some are solitary and others colonial. All California bat species are insectivorous and they provide an ecologically valuable service of consuming vast quantities of insect pests such as mosquitos (Gannon 2003). Though they generally benefit humans greatly, bats secretive nature, nocturnal habits, coarse appearance, ability to fly, and habitation near humans have contributed to folklore, superstition, fear and ultimately persecution.

Some species of colonial bats can become structural pests when they establish colonies in homes or other human structures. Some species prefer dark open spaces, such as attics and basements and others prefer small cracks/crevices, such as between roof tiles/shingles or behind shutters (Greenhall and Frantz 1994). One human structure can actually support a wide diversity of bat species. Though many bat species are tolerant of humans, many humans are not tolerant of bats.

Common nuisances or damages caused by bats are noise coming from bat roosts, smells coming from their urine and guano, potential disease such as rabies and histoplasmosis, and discomfort anytime their presence is too close to humans in structures (CDFW 2008). Most bat damage can be mitigated with prevention and habitat modification techniques to make human structures less inviting or completely exclude bat roosting.

6.5.8.1 Prevention and Habitat Modification

- Carefully assess where bats are entering structures and modify the building to exclude future entry. Since bats are extremely small, fly, and can squeeze into very small spaces, assessing bat entry points can be a tedious and challenging exercise. Evaluate spaces during day/nighttime hours, and use smoke pens and infrared cameras to assist in detecting breeches to the building envelope. Consult bat exclusion specialists for challenging structural projects.
- Install flashing, screening or netting in obvious roof/gable areas where bats can roost.
- Caulk cracks in masonry, especially chimneys.
- Use one-way trap doors to allow bats to escape roost areas after exclusionary methods are completed.

6.5.8.2 Trapping

Trapping is not recommended as its more time consuming and less effective than strategic exclusion as discussed above.

6.5.8.3 Chemical Control

Currently there are no toxicants or fertility control agents available in California for these species.

6.5.9 Feral domestic pets

Domestic pets such as feral cats and stray dogs can sometimes become structural pests. Uncontrolled feral domestic pets, unlike most wildlife, are often highly habituated to humans and therefore more likely to come in very close contact with people. These close encounters can lead to increased chances of physical injury, disease transmission, and contamination of Authority facilities.

Cats and dogs are generally considered private personal property when ownership can be established through collars, registration tags, microchips, tattoos, brands or other proof of ownership. Pets without identification can be considered free roaming, uncontrolled private property or feral (wild) animals. In California, both state and local laws govern domestic animal damage control under Fish & Game, agriculture codes, and local ordinances. Authority staff will consult local city and county ordinances and animal control departments when conducting any domestic animal control actions.

6.5.9.1 Prevention and Habitat Modification

- Feral domestic pets are often relics of old structures/settlements. If the Authority inherits older buildings/infrastructure, consider demolition or wildlife exclusion retrofitting so the structures can no longer support animals.
- Control of excessive rodent populations in structures can also help control feral cat populations.
- Ensure outside garbage cans and dumpsters have tight-fitting lids to prevent foraging on human food waste. This is especially important in public gathering areas in parks and open spaces. Cans with domed lids and self-closing, hinged lids are preferred in these outside areas.
- Ensure Authority staff have properly placed any bird feeders or bird nest boxes such that they do not also serve as cat feeding stations.
- Prohibit staff visitors from feeding feral domestic pets on Authority property. Develop education programs to encourage the public not to feed wildlife or feral animals on Authority property if needed.

6.5.9.2 Trapping

Live trapping is effective to capture problem cats but generally ineffective for dogs in California (Fitzwater 1994, Green and Gipson 2012). Because feral domestic pets may be private property, Authority staff will conduct all trapping in conjunction with local animal control departments and/or animal shelters.

7 Guidance for Pest Control in Recreational Facilities

7.1 Definition and Purpose

Recreational facilities within Authority Preserves are areas where the public use is most likely to occur. Recreational facilities include parking lots, roads and trail, bridges, gates, bathrooms, picnic areas, etc. Nuisance pests in and around recreational facilities are plants, insects, and wildlife that can temporarily affect the Authority's visitor experience in a negative manner. Sometimes managing nuisance pests involves managing the facility so that extra resources attracting the pest are no longer found (i.e., controlling trash in picnic areas). Other times nuisance pests may be removed.

The purpose of pest control in and around recreational facilities is to manage pest for human enjoyment of the natural and scenic qualities of the preserves and to ensure access on roads for safety purposes. The outdoor nature of the preserves implies a certain amount of nuisance pests are expected to be found on preserves (i.e. biting insects, poison oak). The determination of a nuisance pest can be variable depending on the tolerance level of the staff or visitors. Any pest control solution must also consider protection of the surrounding natural resources as a primary consideration.

7.2 Types of Pests

Nuisance pests include native and naturalized plants, insects and wildlife that are present throughout the region and are usually compatible with public use of the preserves. Conflict only occurs when these species become overabundant or exceptionally close to staff and visitors. For example, native social wasps in outside areas would normally be tolerated, but a wasp nest in a public bathroom would be considered an unacceptable risk to visitor health and enjoyment of Authority facilities. Other types of pests include mosquitos, ticks, rattlesnakes, and native vegetation such as poison oak, stinking, or scratching plants. Treatment is also dependent on the amount of use a facility receives. For instance, brushing (removing) poison oak at trailheads and picnic areas is more appropriate than doing so along a remote trail.

7.3 Pest Management Strategies

Many pest encounters can be managed with cultural control options such as changing human behavior. These types of activities include removing food-related trash and installing educational signs about how to identify poison oak and the harm of feeding wildlife. Other types of prevention involve engineering control such as securing garbage cans and sealing off structures. Many of the strategies for structures (Section 6) will also reduce pests in recreational facilities (such as securing openings to buildings).

Many nuisance pests can be managed through preventative treatments based on an understanding of their biology and behavior. Vegetation types that are regularly mowed with mechanical equipment have predictable regrowth times that can be incorporated into routine maintenance schedules. To prevent road and trailside vegetation from becoming a nuisance pest, mechanical brushing can be scheduled for specific times of the year to prevent the hazard from becoming a problem. Roadside brushing also serves the purpose of reducing the chances of visitors and staff encountering ticks and rattlesnakes along trails and roads.

Pest management options for nuisance pests in and around recreational facilities are the same for the insect and wildlife species in buildings (Section 6). The following describes strategies for additional nuisance pests not addressed in that section, which summarized in Table 18.

Table 18: Pests in recreational areas and their treatments

Pest	Treatment
Mosquitos	Use a combination of the following: • Inspect areas in vicinity of problem area for standing water and other potential mosquito breeding sites. Where possible, repair or drain/eliminate potential breeding habitats • Educate visitors about mosquitos and human health risks by posting temporary signs in problem areas • Protect workers by requiring use of protective clothing when working in affected areas • For ongoing pest issues, contact the Santa Clara County Vector Control District to schedule treatment (to comply with legal requirements to control mosquitos for human health and safety).
Social Wasps	For populations causing human conflict near structures use a combination of the following: • Remove or enclose attractants in well-sealed containers (trash cans, etc.) • Use baited non-toxic water traps (late winter and early spring) • Use non-toxic lure traps set approximately 200 feet apart. For nests that pose an immediate threat to human safety: • Physically remove problem nests with water jets or by digging • Use Pyrethrin aerosol spray to target individual nests
Ticks	For detections of multiple individuals in work areas or offices use a combination of the following: • Remove and destroy individual ticks • Follow preventative trail maintenance procedures for native vegetation
Rattlesnakes	For individuals within structures or recreational facilities where contact with humans is likely use a combination of the following: • Trap and relocate • Block access to structures and remove hiding places adjacent to structures and high public use areas.
Native vegetation along roads and trails (poison oak, stinging or scratching plants, brush)	For vegetation causing severe discomfort or hazards to visitors and staff, limit sight lines, or that are blocking emergency access: • Mow and prune buffers along trails and roads to reduce direct contact • Herbicide use if needed, particularly for perennial species

Table modified from MROSD IPM Guidance Manual (May and Assoc. et al. 2014)

7.3.1 Mosquitos

7.3.1.1 Background Information

Mosquitos are a family of small, midge-like flies in the *Culicidae* family. Most mosquitoes are considered a pest because they consume blood from vertebrates, including humans, and can transmit diseases and cause uncomfortable dermatitis. Mosquitos go through four life stages: egg, larva, pupa, and adult. The first three life stages are largely aquatic and last approximately 14 days. Control of wet areas, including stagnant standing rain water, stock ponds, and ponded water from leaky pipes are therefore an effective control strategy for controlling this pest species, although this strategy needs to be balanced with natural resource protection. The females of many, but not all species of mosquitoes, consume blood during a portion of their life cycle. In feeding on blood, some species of mosquitos can transmit extremely harmful human and livestock diseases, such as West Nile virus. Therefore, pest control should focus on elimination of stagnant water and wet area habitat, as well as on control of adults' population numbers, where a health concern is detected.

Although mosquitos are members of the ecosystems of natural areas, the threat of mosquito bites makes them unwelcome in and near buildings and recreational facilities. Mosquitos are generally only considered pests when their population numbers are incompatible with human health and safety, at which point the Authority will contact the Santa Clara County Vector Control District.

7.3.1.2 Pest Management Strategies for Mosquitos

7.3.1.2.1 Prevention

In addition to the actions taken by the Santa Clara County Vector Control District to detect and control mosquito populations in natural areas, the Authority can also implement many non-chemical, cultural control methods to prevent infestation or reduce the number of adult mosquitoes that come into contact with workers and visitors. Depending on the situation, the most important usually include:

- Source reduction (e.g., removing stagnant water around public use facilities), and
- Education (e.g., posting public information signs to inform visitors about mosquitos and human health risks).

7.3.1.2.2 Physical Control

- Install and maintain window screening in recreational buildings.
- Train staff to protect themselves from exposure by wearing long-sleeved clothing, tucking pant legs into socks and/or taping pant cuffs close to the body.

7.3.1.2.3 Chemical Control

Where chemical control is determined to be the only viable treatment option for a specific concern to human health and safety around a recreational facility, the Authority will contact the Santa Clara County Vector Control District for assistance.

7.3.2 Social Wasps

7.3.2.1 Background Information

Social wasps are a large group of native stinging insects that include yellow jackets, hornets, and mud daubers. Wasps' yellow and black color schemes and social behavior are shared with distantly related bees. Like bees, wasps are an important group of native insects that perform valuable ecological functions in our natural world (Hinkle et al. 2002). Most of the species in this group are generalist insect predators that are essential in their natural environments to aid in decomposition, control populations of other insects, and some even pollinate flowers like bees. Although wasps are important members of the ecosystems of natural areas, the threat of wasp stings makes them unwelcome intruders in and near buildings and recreational facilities. Social wasps are generally only considered pests when their nests are located in areas where they are incompatible with human use. For example, when social wasps nest under the eaves of buildings or alongside trails, they can sometimes exhibit aggressive protective behaviors that can threaten humans with painful and sometimes dangerous stings. Where multiple stinging incidents occur, Authority staff will consider control of wasp nests.

Wasps belong to a large group of insects in the family *Hymenoptera* that includes ants, bees, and wasps. Many genera and species within *Hymenoptera* are difficult to tell apart as they share similar body shapes and color schemes. Because many of these *Hymenopteran* insects have protective stings and bites, even some other species outside the family like flies have adapted their body styles to mimic wasps. For this reason, staff must be careful to properly identify the pest to species to ensure that it is an actual nuisance pest species that can sting, rather than a similarly shaped or colored harmless species.
Like bees, wasps are social organisms that live together in colonies where individuals have specialized roles. Queens emerge from hibernation each spring to build nests and start larger colonies composed of workers. Pupae are raised in cell-like structures within paper or mud nests that are tended by workers and queens. Different species build different types of nests – from small mud structures that are attached to ledges to aerial and underground paper-type nests. Different species also have different foraging habits. Some prefer hunting for carrion and sweet liquids while others prefer hunting live prey. The species that forage for carrion and sweet liquids are often the most problematic individuals that disturb picnickers.

7.3.2.2 Pest Management Strategies for Social Wasps

7.3.2.2.1 Prevention

- Ensure outside garbage cans and dumpsters have tight-fitting lids to prevent wasps from foraging on human food wastes. This is especially important in public picnic and gathering areas in parks and open spaces. Can with domed lids and self-closing, hinged lids are preferred in these outside areas.

- Periodically clean the hinged-lids of garbage and recycling bins so spilled sweet liquids do not attract wasps to picnic areas.
- Ensure all exterior windows that have tight-fitting insect screens to prevent wasps from gaining entry from the outside when windows are opened.

7.3.2.2.2 Physical Control

- Install baited non-toxic water traps in late winter and early spring to reduce queens in problem areas where wasps are known to be regularly problematic.
- Install pesticide-free lure traps set approximately 200 feet apart in outside problem areas where human/wasp conflicts are known to occur (e.g. picnic areas, outside amphitheaters). Place traps between the center of human activity and natural areas in an attempt to attract wasps away from humans instead of attracting more wasps to human areas. Remove the traps when the problem is resolved so that other insects are not affected.
- Physically remove problem wasp nests with water jets or by digging them out of underground locations. Ensure pest control workers wear protective beekeeper suits to reduce the potential for dangerous stings.

7.3.2.2.3 Chemical Control

Pyrethrin Aerosol Sprays. Pyrethrin-type aerosol sprays containing d-trans allethrin and phenothrin are only recommended where immediate threats exist to human health and safety. These aerosol sprays are extremely effective at immediately eliminating single, problem wasp nests that threaten Authority staff or visitors. The pyrethrin-type sprays work as a contact neuro-poison that results in near immediate mortality of any insect (Jackson et al. 2011). The sprays offer a relatively safe and effective means for Authority staff to respond to immediate threats of wasp nests. Contact pyrethrins are completely non-selective, so care must be taken to target only the pest wasp and not to impact other beneficial insects. Contact sprays do not offer population-level control for wasps; diligent sanitation and early seasonal queen trapping are the only known methods to effectively reduce populations of stinging wasps in open landscapes.

7.3.3 Ticks

7.3.3.1 Background Information

The western black-legged tick (*Ixodes pacificus*) is a native arachnid (i.e., spider relative) that is very common in grasslands, scrub, and woodlands throughout Authority lands. Black-legged ticks are common parasites of native mammals such as deer, but they can also be problematic parasites of Authority visitors and staff. To complete their life cycles, ticks must feed on blood and for this reason can also be dangerous vectors that can transmit blood-borne diseases such as Rocky Mountain spotted fever, Lyme disease, and tularemia (CDC 2013b). Ticks are an important part of the natural environment and are present on Authority lands in abundance. Due to their prevalence in naturally occurring deer populations that move through Authority lands, eradication of ticks in natural areas is impossible; however, some level of preventative control may be warranted in high visitor use areas in and around recreational facilities and buildings. Ticks can be especially problematic indoors where field staff work and store clothing; staff returning from field work can unknowingly introduce ticks into buildings where they can be transmitted to unsuspecting office workers.

7.3.3.2 Pest Management Strategies for Ticks

7.3.3.2.1 Prevention

- In high visitor use areas, regularly cut or mow alongside trails and picnic areas to reduce the chance of visitors and staff picking up ticks. Ticks often summit tall grass blades and shrub branches to "catch" or brush against a passing animal. Keeping vegetation cut low and pruned reduces the opportunities for ticks to utilize this strategy in areas with high pedestrian use.
- Post tick educational materials in Authority offices and at major trailheads and parking areas.
- Regularly vacuum carpeted areas where Authority employees work.
- Ensure all exterior windows that open have tight-fitting insect screens to prevent ticks from gaining entry from outside when windows are opened.

7.3.3.2.2 Physical Control

- If needed, install carbon dioxide traps to collect ticks where field staff regularly begin and end days. This may be especially effective in staff changing rooms where field clothes are shed, changed, and stored, or where staff enter their daily log information.
- Train staff to protect themselves from exposure by wearing light colored long-sleeved clothing, tucking pant legs into socks, and/or taping pant cuffs close to the body; performing regular inspections of clothing and exposed areas such as the head and neck; and showering or bathing and inspecting their bodies as soon as possible upon completion of work.
- Post educational signs with the information above to help inform visitors of tick prevention and detection strategies they can employ before and after using recreational facilities.
- As ticks are found, remove and destroy individuals. If ticks are already attached to the body, they should be sent in to Valley Health to test for Lyme disease.

7.3.3.2.3 Chemical Control

No chemical control strategies are recommended for ticks.

7.3.4 Rattlesnakes

7.3.4.1 Background Information

Rattlesnakes are the only type of venomous snake found in California. They are native to California and are considered to be important predators that help keep rodent populations under control. Rattlesnakes are generally extremely wary of humans and tend to shy away from human activities. They are not aggressive towards humans unless cornered, surprised, or stepped-on. Occasionally, they can be considered nuisance pests when they find themselves too close to recreational facilities, occupied buildings, or other areas where human encounters are likely. Though important to the natural world, the threat of rattlesnake bites makes them unwelcome pests in certain portions of Authority lands.

7.3.4.2 Pest Management Strategies for Rattlesnakes

7.3.4.2.1 Prevention

- Authority field staff can protect themselves from rattlesnake bites during workdays by wearing high-top leather boots and snake-resistant chaps or gaiters. Snake gaiters are also useful in preventing the dispersal of non-native weed seeds, since weed seeds usually do not penetrate the gaiters.
- Educational materials can warn visitors about rattlesnake hazards and suggest preventative actions such as wearing protective clothing, as described above for Authority field staff.

7.3.4.2.2 Habitat Modification

- Eliminate hiding places for snakes by trailheads, trail right-of-ways, and parking areas with brushing, removing rock and brush piles near busy human use areas especially those with children, and filling cracks and holes in publicly accessible buildings. Use stainless steel/bronze mesh or welded wire to plug/fill cracks and holes in the exterior of buildings where snakes could gain entry.

- Where rattlesnake sightings are common, manage recreational facilities during the spring and summer months to reduce suitable habitat, and especially eliminate hiding places for snakes (e.g., brushing trailheads and parking areas, removing rock and brush piles, managing localized prey populations near known snake problem area, filling cracks and holes in public accessible buildings).

7.3.4.2.3 Physical Control

- Tongs and Funnel Traps. In certain areas (especially in structures and recreational facilities where humans gather and there is potential for snakebites), the Authority may elect to capture and relocate, or eliminate single problem snakes.

- Using snake tongs, snake hooks or shovels, capture and relocate or eliminate problem rattlesnakes. Captured rattlesnakes can be placed in a secure container for relocation in the preserve to suitable habitat away from people. Occasionally, because of site conditions or the urgency of the situation, a staff member or tenant may need to kill a rattlesnake with a shovel.
- Funnel traps can be used to collect problem snakes. Traps must be checked daily to ensure that non-target wildlife is not trapped accidentally.

7.3.4.2.4 Chemical Control

Currently there are no toxicants or fertility control agents available in California for rattlesnakes.

7.3.4.3 Other Native and Domestic Mammals

Section 6.5 discusses management of skunks, raccoons, opossum, and feral cats/dogs,

7.4 Vegetation Management of Trails and Other Recreational Facilities

The majority of IPM activity associated with recreational facilities is annual brushing (i.e. pruning of vegetation along roads and trails) which keeps them open for vehicular, horse, bicycle and human foot traffic, and provides a buffer area to separate humans from pests like ticks, rattlesnakes, and poison oak. Mowers and saws may be used by Authority staff to maintain grass and shrubs near roads and trails in short stature, limb up overhanging tree branches, and remove dead or decadent vegetation. Wider strips of brushing occur along certain roads to provide access for emergency vehicles.
The following section outlines typical vegetation management actions conducted in right of way areas on Authority lands.

7.4.1 Pest Management Strategies for Vegetation Rights-of-way

7.4.1.1.1 Physical Control

Mechanically mow or brush annually to maintain existing recreational facilities:

- **Road and trail brushing**. Mechanical mowing is used to prevent nuisance vegetation from impeding roads and trails. This work is primarily mechanical work and is done with weed whips, hedgers, chainsaws, poles saws, chippers, and tractor-operated mowers. The frequency of brushing depends on the use of the road/trail, weather conditions, and location. Areas of high use or where access is needed for safety are brushed more frequently than remote locations.
- **Parking lots, gates, fences, and stiles.** Mechanical mowing is used to prevent nuisance vegetation from encroaching on or near parking lots, gates and stiles. This work is mechanical and is primarily done with weed whips.
- **Special events**. When special events occur in the preserves each year that require mowing of grassy areas for parking and walking. Events include press events, the Volunteer Recognition Event, and other gatherings.

- **Hazard and downed trees.** Hazard and downed trees are limbed or removed because they present a fall hazard across a public facility such as a trail, are blocking roads, trail, or parking lots, or are otherwise hazardous to visitors, staff, or contractors. The trees may be dead or alive. Stumps of live trees may be treated with herbicide to prevent re-growth.
- **Utility poles and boxes.** Grubbing to bare mineral dirt is used around utility poles and boxes to reduce the risk of fire.

7.4.1.1.2 Chemical Control

Chemical control is typically not used for right-of-way clearing unless perennial plants require permanent treatment (for example, some problem vegetation, such as poison oak, can be eliminated from specific locations with spot application of herbicides.), are near paved surfaces, or around utility poles. Chemicals to be used for vegetation management are listed below.

- **Glyphosate,** the active ingredient in Roundup™ (previously sold as Aquamaster™), is a broad- spectrum non-selective systemic herbicide used to control a wide variety of plants, including annual broadleaf weeds, grasses, perennials, and woody plants. It is absorbed through foliage and translocated to growing points. Glyphosate's mode of action is to inhibit an enzyme involved in the synthesis of aromatic amino acids, making it effective on all herbaceous and woody growing plants. It is a rather slow-acting herbicide with symptoms typically appearing with a week, including yellowing and stunting a young leaves and growing points, however it may take up to several weeks for a plant to die.
- **Imazpyr,** the active ingredient in Polaris™ (previously sold as Habitat™), is a non-selective herbicide used to control a broad range of weeds including grasses, broadleaf herbs, woody plants, riparian plants, and emergent aquatic species. Imazapyr has a similar mode of action as glyphosate but acts on a different suite of essential amino acids. Imazapyr is absorbed by leaves and roots, and moves to growing points; it disrupts protein synthesis and interferes with cell growth and DNA synthesis, plants die as a result of AHS inhibition. To be effective on aquatic plants, the majority of plant parts must be accessible above the waterline. Imazapyr can be useful for difficult-to-control species when glyphosate is less effective, and with much lower application rates.

Resources

The following are websites that contain invasive plant management information and resources.

The California Department of Pesticide Regulation www.cdpr.ca.gov
This site provides information about herbicide use including measures to protected listed species.

California Department of Food and Agriculture Integrated Pest Control Branch: http://www.cdfa.ca.gov/plant/ipc/index.html)
The Integrated Pest Control Branch conducts a wide range of pest management and eradication projects as part of the Division of Plant Health and Pest Prevention Services Pest Prevention Program. This site provides the Encycloweedia, noxious weeds and weed ratings, and the CalWeed Database.

CalFlora: http://www.calflora.org/
This web-based database provides records of all wild plants (i.e. plants that occur in the wild as opposed to only gardens), including native and exotic species. It identifies species that are included on the Cal-IPC invasive plant inventory. CalFlora is also a portal for the Weed Manager database (below).

California Invasive Plant Council: http://www.cal-ipc.org
This site provides a wide range of invasive plant information specific to California. Resources include prevention, invasive plant inventory, Weed Mapper, invasive plant profiles with links to articles, publications, reports, and educational brochures.

Center for Invasive Plant Management (http://www.weedcenter.org
The Center for Invasive Plant Management (CIPM) is a hub for management information in the western U.S. Includes plant biology and management information; education information; and publications. CIPM also provides grants to weed projects in western states. Grant information is available at this site.

Invasive.org: Center for Invasive Species and Ecosystem Health http://www.invasive.org
This site provides an easily accessible archive of high quality images of invasive and exotic species of North America with identifications, taxonomy and descriptions for use in educational applications.

Invasive Species Council of California http://www.iscc.ca.gov
The invasive Species Council of California provides general information on invasive species in California including animals, plants, insects, and plant and animal disease.

National Invasive Species Council http://www.invasivespecies.gov
The National Invasive Species Council (NISC) was established by Executive Order (EO) 13112 to ensure that Federal programs and activities to prevent and control invasive species are coordinated, effective and efficient.

National Invasive Species Information Center http://www.invasivespeciesinfo.gov
This site is a gateway to invasive species information; covering Federal, State, local and international sources. The information center is maintained by the U.S. Department of Agriculture's National Agricultural Library.

The National Resource Conservation Service (NRCS):
www.nrcs.usda.gov/wps/portal/nrcs/main/national/programs/alphabetical
This site lists all NRCS conservation programs, including programs to assist with weed management.

USDA Forest Service Invasive Species Program: Control and Management
http://www.fs.fed.us/ invasivespecies/controlmgmt/index.shtml
This site provides links for more information on research, management planning, Forest Service activities, and pest-specific control and management.

Weed Manager: http://www.calflora.org/entry/weed-mgr.html
Weed Manager (WM) is a system which enables organizations engaged in land management to track weed infestations and treatments over time. The Authority is currently using this system to map and track treatment of invasive plants.

Weed Research and Information Center http://wric.ucdavis.edu The University of California's Weed RIC provides control notes and photos for invasive plants as well as agricultural weeds.

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Appendix A Best Management Practices for Pesticide Use

Best management practices (BMPs) can minimize or eliminate possible effects associated with pesticide usage to non-target species and/or sensitive habitats, as well as degradation of water quality from drift, surface runoff, or leaching.

The BMPs address mixing, handling, and application of all ground-based treatments of pesticide that will considered and utilized, as appropriate, based upon target- and site-specific factors and time-specific environmental conditions. Along with the overall IPM approach to prevent, control, eradicate, and contain pests, these BMPs to eliminate and/or reduce potential impacts to non-target resources.

A.1 Pesticide Handling and Mixing

- As a precaution against spilling, spray tanks will not be left unattended during filling. All pesticide spray equipment will be properly cleaned.
- Where possible, rinsate will be used as part of the makeup water in the sprayer tank and applied to treatment areas.
- All pesticide containers will be triple rinsed, and the rinsate will be used as water in the sprayer tank and applied to treatment areas.
- When a pesticide container is marked as recyclable, Authority staff will deliver the triple rinsed pesticide containers to the appropriate herbicide container collection site.
- All unused pesticides will be properly discarded at a local “safe send” collection.
- Pesticides and pesticide containers will be lawfully stored, handled, and disposed of in accordance with the label and in a manner that will safeguard human, fish, and wildlife health and that will prevent soil and water contamination.
- Authority staff will consider the water quality parameters (e.g., pH, hardness) that are important to ensure the greatest efficacy when specified on the pesticide label.
- All pesticide spills will be addressed immediately.

A.2 Applying Pesticide

- Authority staff will comply with all Federal, State, and local pesticide use laws and regulations. For example, Authority staff will use application equipment and apply rates for the specific pest(s) identified on the pesticide label.
- Before each treatment season and prior to mixing or applying any product for the first time each season, all applicators will review the product label pesticide label.
- Follow the label recommendations for the buffer zone from the water’s edge will be used, where applicable, and when it does not detrimentally influence effective control of pest species.

- Applicators will use low impact herbicide application techniques (e.g., spot treatment, cut stump, oil basal, Thinvert system applications) rather than broadcast foliar applications (e.g., boom sprayer, other larger tank wand applications), wherever practical.
- Applicators will use low volume rather than high volume foliar applications when the low impact methods described above are not feasible or practical to maximize herbicide effectiveness and ensure correct and uniform application rates.
- Applicators will use and adjust spray equipment to apply the coarsest droplet size spectrum with optimal coverage of the target species while reducing drift.
- Applicators will use the largest droplet size that results in uniform coverage.
- Applicators will use drift reduction technologies such as low-drift nozzles, where possible.
- Spraying will occur during low (average less than 7 mph; preferably 3-5 mph) and consistent direction wind conditions with moderate temperatures (less than 85 F).
- Applicators will avoid spraying during inversion conditions (often associated with calm or very low wind conditions) that can cause large-scale herbicide drift to non-target areas. Equipment will be calibrated regularly to ensure that the proper rate of pesticide is applied to the target area or species.
- Spray applications will be made at the lowest height for uniform coverage of target pests to minimize or eliminate potential drift. If windy conditions frequently occur during afternoons, spraying (especially boom treatments) will typically be conducted during early morning hours.
- Spray applications will not be conducted on days with greater than 30 percent forecast for rain within six hours, except for pesticides that are rapidly rain fast (e.g., glyphosate in 1 hour) or pesticides that need rain to activate the product (e.g., oryzalin) so as to minimize or eliminate potential runoff.
- Applicators will use drift retardant adjuvants during spray applications, especially adjacent to sensitive areas.
- Applicators will use a non-toxic dye to aid in identifying treated target areas and any areas of overspray or drift. A dye can also aid in detecting equipment leaks. If a leak is discovered, application will stop until repairs are made to the sprayer.
- When drift cannot be sufficiently reduced through altering equipment set up and application techniques, buffer zones may be identified to protect sensitive areas downwind of applications.
- When an application is required adjacent to a sensitive habitat area, it will only occur when the wind is blowing away from the habitat area.
- To eliminate unnecessary pesticide applications, Authority staff will examine the target area for the presence of expected pests prior to applying a pesticide product.
- Authority staff will consider the timing of a pesticide application to ensure that native plants are protected (e.g., senescence) while effectively treating invasive plants.
- Application equipment (e.g., backpack sprayer, transport vehicles) will be thoroughly cleaned and PPEs removed and properly disposed of on-site after treatments.

Appendix C

Special-Status Species

Methods

The species tables in this appendix were developed through a review of relevant databases, and other available information. The California Native plant Society (CNPS) Inventory of Rare and Endangered Plants (CNPS 2021) and CDFW's California Natural Diversity Database (CNDDB) (CNDDB 2021) were reviewed for specific information on documented observations of special-status species previously recorded in the IPM Program Area and vicinity. A search of the CNDDB and CNPS was conducted for the following U.S. Geological Survey 7.5' quadrangles surrounding the IPM Program Area: Calaveras Reservoir, La Costa Valley, Mendenhall Springs, Mt. Day, San Jose East, Eylar Mountain, Isabel Valley, Lick Observatory, Santa Teresa Hills, Los Gatos, San Jose West, Morgan Hill, Mount Sizer, Mount Madonna, Gilroy, Loma Prieta, Laurel, Gilroy Hot Springs, Mississippi Creek, Pacheco Creek, San Felipe, Three Sisters, Chittenden, San Juan Bautista, and Watsonville East.

Table C-1 Special-Status Botanical Species Known to Occur in the Project Region and their Potential for Occurrence in the Program Area

Species	Federal Status [1]	State Status [1]	CRPR Status [1]	Habitat and Blooming Period	Potential for Occurrence [2]
Sharsmith's onion *Allium sharsmithiae*			1B.3	Ultramafic. Cismontane woodland, chaparral. Rocky, serpentine slopes. 1591–3199 feet in elevation. Blooms March–May.	**Not Expected to Occur.** Suitable habitat is present in the IPM Program Area; However, IPM Program Area is below elevational range of the species. No documented occurrences within the IPM Program Area (CNPS 2021), and the Program Area is outside of the range of the species.
bent-flowered fiddleneck *Amsinckia lunaris*			1B.2	Cismontane woodland, valley and foothill grassland, coastal bluff scrub. 10–2608 feet in elevation. Blooms March–June.	**Could Occur.** Suitable habitat is present in the IPM Program Area. The IPM Program Area is within the elevational and geographic range of the species, and there are documented occurrences within the region (CNPS 2021).
Anderson's manzanita *Arctostaphylos andersonii*			1B.2	Broadleaved upland forest, chaparral, north coast coniferous forest. Open sites, redwood forest. 197–2493 feet in elevation. Blooms November–May.	**Could Occur.** Suitable habitat is present in the IPM Program Area. The IPM Program Area is within the elevational and geographic range of the species, and there are documented occurrences within the region (CNPS 2021).
Pajaro manzanita *Arctostaphylos pajaroensis*			1B.1	Chaparral. Sandy soils. 98–509 feet in elevation. Blooms December–March.	**Not Expected to Occur.** Suitable habitat is present in the IPM Program Area. The IPM Program Area is within the elevational range of the species. No documented occurrences within the IPM Program Area (CNPS 2021), and the Program Area is outside of the range of the species.
Kings Mountain manzanita *Arctostaphylos regismontana*			1B.2	Broadleaved upland forest, chaparral, north coast coniferous forest. Granitic or sandstone outcrops. 787–2313 feet in elevation. Blooms December–April.	**Could Occur.** Suitable habitat is present in the IPM Program Area. The IPM Program Area is within the elevational and geographic range of the species, and there are documented occurrences within the region (CNPS 2021).
Bonny Doon manzanita *Arctostaphylos silvicola*			1B.2	Chaparral, closed-cone coniferous forest, lower montane coniferous forest. Only known from Zayante (inland marine) sands in Santa Cruz County. 492–1706 feet in elevation. Blooms January–March.	**Not Expected to Occur.** Suitable Zayante sands are not present in the IPM Program Area. The IPM Program Area is within the elevational range of the species. No documented occurrences within the IPM Program Area (CNPS 2021), and the Program Area is outside of the range of the species.

Species	Federal Status [1]	State Status [1]	CRPR Status [1]	Habitat and Blooming Period	Potential for Occurrence [2]
big-scale balsamroot *Balsamorhiza macrolepis*			1B.2	Ultramafic. Chaparral, valley and foothill grassland, cismontane woodland. Sometimes on serpentine. 115–4806 feet in elevation. Blooms March–June.	Could Occur. Suitable habitat is present in the IPM Program Area. The IPM Program Area is within the elevational and geographic range of the species, and there are documented occurrences within the region (CNPS 2021).
Mount Day rockcress *Boechera rubicundula*			1B.1	Chaparral. Rocky slopes. 3937–3937 feet in elevation. Blooms April–May.	Not Expected to Occur. Suitable habitat is present in the IPM Program Area; However, IPM Program Area is below elevational range of the species. No documented occurrences within the IPM Program Area (CNPS 2021), and the Program Area is outside of the range of the species.
Santa Cruz Mountains pussypaws *Calyptridium parryi* var. *hesseae*			1B.1	Chaparral, cismontane woodland. Sandy or gravelly openings. 984–5036 feet in elevation. Blooms May–August.	Could Occur. Suitable habitat is present in the IPM Program Area. The IPM Program Area is within the elevational and geographic range of the species, and there are documented occurrences within the region (CNPS 2021).
chaparral harebell *Campanula exigua*			1B.2	Ultramafic. Chaparral. Rocky sites, usually on serpentine in chaparral. 902–4101 feet in elevation. Blooms May–June.	Could Occur. Suitable habitat is present in the IPM Program Area. The IPM Program Area is within the elevational and geographic range of the species, and there are documented occurrences within the region (CNPS 2021).
Sharsmith's harebell *Campanula sharsmithiae*			1B.2	Ultramafic. Chaparral. Serpentine barrens. 1394–2805 feet in elevation. Blooms April–June.	Not Expected to Occur. Suitable habitat is present in the IPM Program Area. The IPM Program Area is within the elevational, but not the geographic range of the species. There are no documented occurrences within the IPM Program Area (CNPS 2021).
bristly sedge *Carex comosa*			2B.1	Wetland. Marshes and swamps, coastal prairie, valley and foothill grassland. Lake margins, wet places; site below sea level is on a Delta island. -16–5315 feet in elevation. Blooms May–September.	Could Occur. Suitable wetland habitat may be present within the IPM Program Area. The IPM Program Area is within the elevational and geographic range of the species, and there are documented occurrences within the region (CNPS 2021).
deceiving sedge *Carex saliniformis*			1B.2	Wetland. Coastal prairie, coastal scrub, meadows and seeps, marshes and swamps (coastal salt). Mesic sites. 10–755 feet in elevation. Blooms June (July).	Could Occur. Suitable wetland habitat may be present within the IPM Program Area. The IPM Program Area is within the elevational and geographic range of the species, and there are documented occurrences within the region (CNPS 2021).
Tiburon paintbrush *Castilleja affinis* var. *neglecta*	E	T	1B.2	Ultramafic. Valley and foothill grassland. Rocky serpentine sites. 394–1312 feet in elevation. Blooms April–June.	Could Occur. Suitable habitat is present in the IPM Program Area. The IPM Program Area is within the elevational and geographic range of the species, and there are documented occurrences within the region (CNPS 2021).

Species	Federal Status [1]	State Status [1]	CRPR Status [1]	Habitat and Blooming Period	Potential for Occurrence [2]
pink creamsacs *Castilleja rubicundula* var. *rubicundula*			1B.2	Ultramafic. Chaparral, cismontane woodland, meadows and seeps, valley and foothill grassland. Openings in chaparral or grasslands. On serpentine. 66–3002 feet in elevation. Blooms April–June.	**Could Occur.** Suitable habitat is present in the IPM Program Area. The IPM Program Area is within the elevational and geographic range of the species, and there are documented occurrences within the region (CNPS 2021).
Coyote ceanothus *Ceanothus ferrisiae*	E		1B.1	Ultramafic. Chaparral, valley and foothill grassland, coastal scrub. Serpentine sites in the Mt. Hamilton range. 492–1509 feet in elevation. Blooms January–May.	**Could Occur.** Suitable habitat is present in the IPM Program Area. The IPM Program Area is within the elevational and geographic range of the species, and there are documented occurrences within the region (CNPS 2021).
Congdon's tarplant *Centromadia parryi* ssp. *congdonii*			1B.1	Valley and foothill grassland. Alkaline soils, sometimes described as heavy white clay. 0–755 feet in elevation. Blooms May–October (November).	**Could Occur.** Suitable habitat and soils may be present in the IPM Program Area. The IPM Program Area is within the elevational and geographic range of the species, and there are documented occurrences within the region (CNPS 2021).
dwarf soaproot *Chlorogalum pomeridianum* var. *minus*			1B.2	Ultramafic. Chaparral. Serpentine. 1001–3281 feet in elevation. Blooms May–August.	**Could Occur.** Suitable habitat is present in the IPM Program Area. The IPM Program Area is within the elevational and geographic range of the species, and there are documented occurrences within the region (CNPS 2021).
Ben Lomond spineflower *Chorizanthe pungens* var. *hartwegiana*	E		1B.1	Lower montane coniferous forest. Zayante coarse sands in maritime ponderosa pine sandhills. 344–1558 feet in elevation. Blooms April–July.	**Not Expected to Occur.** Suitable Zayante sands are not present in the IPM Program Area. The IPM Program Area is within the elevational range of the species. No documented occurrences within the IPM Program Area (CNPS 2021), and the Program Area is outside of the range of the species.
Ben Lomond spineflower *Chorizanthe pungens* var. *hartwegiana*	E		1B.1	Lower montane coniferous forest. Zayante coarse sands in maritime ponderosa pine sandhills. 344–1558 feet in elevation. Blooms April–July.	**Not Expected to Occur.** Suitable Zayante sands are not present in the IPM Program Area. The IPM Program Area is within the elevational range of the species. No documented occurrences within the IPM Program Area (CNPS 2021), and the Program Area is outside of the range of the species.
Monterey spineflower *Chorizanthe pungens* var. *pungens*	T		1B.2	Coastal dunes, chaparral, cismontane woodland, coastal scrub, valley and foothill grassland. Sandy soils in coastal dunes or more inland within chaparral or other habitats. 0–558 feet in elevation. Blooms April–June (July),(August).	**Could Occur.** Suitable habitat is present in the IPM Program Area. The IPM Program Area is within the elevational and geographic range of the species, and there are documented occurrences within the region (CNPS 2021).
Scotts Valley spineflower *Chorizanthe robusta* var. *hartwegii*	E		1B.1	Meadows, valley and foothill grassland. In grasslands with mudstone and sandstone outcrops. 344–804 feet in elevation. Blooms April–July.	**Not Expected to Occur.** Suitable habitat is present in the IPM Program Area. The IPM Program Area is within the elevational range of the species. No documented occurrences within the IPM Program Area (CNPS 2021), and the Program Area is outside of the range of the species.

Species	Federal Status [1]	State Status [1]	CRPR Status [1]	Habitat and Blooming Period	Potential for Occurrence [2]
robust spineflower *Chorizanthe robusta* var. *robusta*	E		1B.1	Cismontane woodland, coastal dunes, coastal scrub, chaparral. Sandy terraces and bluffs or in loose sand. 30–804 feet in elevation. Blooms April–September.	**Not Expected to Occur.** Suitable habitat is present in the IPM Program Area. The IPM Program Area is within the elevational range of the species. No documented occurrences within the IPM Program Area (CNPS 2021), and the Program Area is outside of the current range of the species.
Mount Hamilton fountain thistle *Cirsium fontinale* var. *campylon*			1B.2	Ultramafic. Cismontane woodland, chaparral, valley and foothill grassland. In seasonal and perennial drainages on serpentine. 328–2920 feet in elevation. Blooms (February), April–October.	**Could Occur.** Suitable habitat is present in the IPM Program Area. The IPM Program Area is within the elevational and geographic range of the species, and there are documented occurrences within the region (CNPS 2021).
San Francisco collinsia *Collinsia multicolor*			1B.2	Closed-cone coniferous forest, coastal scrub. On decomposed shale (mudstone) mixed with humus; sometimes on serpentine. 98–820 feet in elevation. Blooms (February), March–May.	**Could Occur.** Suitable habitat is present in the IPM Program Area. The IPM Program Area is within the elevational and geographic range of the species, and there are documented occurrences within the region (CNPS 2021).
Ben Lomond spineflower *Deinandra bacigalupii*		SC	1B.1	Meadows and seeps. Alkaline meadows. 509–656 feet in elevation. Blooms June–October.	**Could Occur.** Suitable habitat is present in the IPM Program Area. The IPM Program Area is within the elevational and geographic range of the species, and there are documented occurrences within the region (CNPS 2021).
Hospital Canyon larkspur *Delphinium californicum* ssp. *interius*			1B.2	Cismontane woodland, chaparral, coastal scrub. In wet, boggy meadows, openings in chaparral and in canyons. 640–3593 feet in elevation. Blooms April–June.	**Could Occur.** Suitable habitat is present in the IPM Program Area. The IPM Program Area is within the elevational and geographic range of the species, and there are documented occurrences within the region (CNPS 2021).
Santa Clara Valley dudleya *Dudleya abramsii* ssp. *setchellii*	E		1B.1	Ultramafic. Valley and foothill grassland, cismontane woodland. On rocky serpentine outcrops and on rocks within grassland or woodland. 197–1493 feet in elevation. Blooms April–October.	**Known to Occur.** Suitable habitat is present in the IPM Program Area. The IPM Program Area is within the elevational and geographic range of the species, and there are documented occurrences within the IPM Program Area (Authority 2010).
Pinnacles buckwheat *Eriogonum nortonii*			1B.3	Chaparral, valley and foothill grassland. Sandy soils; often on recent burns; western Santa Lucias. 984–3199 feet in elevation. Blooms (April), May–August (September).	**Not Expected to Occur.** Suitable habitat is present in the IPM Program Area. The IPM Program Area is within the elevational range of the species. No documented occurrences within the IPM Program Area (CNPS 2021), and the Program Area is outside of the current range of the species.
Ben Lomond buckwheat *Eriogonum nudum* var. *decurrens*			1B.1	Chaparral, cismontane woodland, lower montane coniferous forest. Ponderosa pine sandhills in Santa Cruz County. 164–2625 feet in elevation. Blooms June–October.	**Not Expected to Occur.** Suitable habitat is present in the IPM Program Area. The IPM Program Area is within the elevational range of the species. No documented occurrences within the IPM Program Area (CNPS 2021), and the Program Area is outside of the range of the species.

Species	Federal Status[1]	State Status[1]	CRPR Status[1]	Habitat and Blooming Period	Potential for Occurrence[2]
Hoover's button-celery *Eryngium aristulatum* var. *hooveri*			1B.1	Vernal pools, wetland. Alkaline depressions, vernal pools, roadside ditches and other wet places near the coast. 3–164 feet in elevation. Blooms (June), Jul (August).	**Not Expected to Occur.** No suitable vernal pool habitat is present in the IPM Program Area. The IPM Program Area is within the elevational range of the species. No documented occurrences within the IPM Program Area (CNPS 2021). The Program Area is within the range of the species.
Santa Cruz wallflower *Erysimum teretifolium*	E	E	1B.1	Lower montane coniferous forest, chaparral. Inland marine sands (Zayante coarse sand). 591–1690 feet in elevation. Blooms March–July.	**Not Expected to Occur.** Suitable Zayante sands are not present in the IPM Program Area. The IPM Program Area is within the elevational range of the species. No documented occurrences within the IPM Program Area (CNPS 2021), and the Program Area is outside of the range of the species.
San Joaquin spearscale *Extriplex joaquinana*			1B.2	Alkali playa. Chenopod scrub, alkali meadow, playas, valley and foothill grassland. In seasonal alkali wetlands or alkali sink scrub with Distichlis spicata, Frankenia, etc. 3–2740 feet in elevation. Blooms April–October.	**Could Occur.** Suitable habitat may be present in the IPM Program Area. The IPM Program Area is within the elevational and geographic range of the species, and there are documented occurrences within the region (CNPS 2021).
minute pocket moss *Fissidens pauperculus*			1B.2	Redwood. North coast coniferous forest. Moss growing on damp soil along the coast. In dry streambeds and on stream banks. 33–3360 feet in elevation.	**Could Occur.** Suitable habitat may be present in the IPM Program Area. The IPM Program Area is within the elevational and geographic range of the species, and there are documented occurrences within the region (CNPS 2021).
talus fritillary *Fritillaria falcata*			1B.2	Ultramafic. Chaparral, cismontane woodland, lower montane coniferous forest. On shale, granite, or serpentine talus. 1394–4708 feet in elevation. Blooms March–May.	**Could Occur.** Suitable habitat is present in the IPM Program Area. The IPM Program Area is within the elevational and geographic range of the species, and there are documented occurrences within the region (CNPS 2021).
fragrant fritillary *Fritillaria liliacea*			1B.2	Coastal scrub, valley and foothill grassland, coastal prairie, cismontane woodland. Often on serpentine; various soils reported though usually on clay, in grassland. 10–1312 feet in elevation. Blooms February–April.	**Could Occur.** Suitable habitat is present in the IPM Program Area. The IPM Program Area is within the elevational and geographic range of the species, and there are documented occurrences within the region (CNPS 2021).
Diablo helianthella *Helianthella castanea*			1B.2	Broadleaved upland forest, chaparral, cismontane woodland, coastal scrub, riparian woodland, valley and foothill grassland. Usually in chaparral/oak woodland interface in rocky, azonal soils. Often in partial shade. 148–3510 feet in elevation. Blooms March–June.	**Not Expected to Occur.** Suitable habitat is present in the IPM Program Area. The IPM Program Area is within the elevational range of the species. No documented occurrences within the IPM Program Area (CNPS 2021). The Program Area is outside the range of the species.
Loma Prieta hoita *Hoita strobilina*			1B.1	Ultramafic. Chaparral, cismontane woodland, riparian woodland. Serpentine; mesic sites. 197–3199 feet in elevation. Blooms May–July (August),(October).	**Could Occur.** Suitable habitat is present in the IPM Program Area. The IPM Program Area is within the elevational and geographic range of the species, and there are documented occurrences within the region (CNPS 2021).

Species	Federal Status[1]	State Status[1]	CRPR Status[1]	Habitat and Blooming Period	Potential for Occurrence[2]
Santa Cruz tarplant *Holocarpha macradenia*	T	E	1B.1	Coastal prairie, coastal scrub, valley and foothill grassland. Light, sandy soil or sandy clay; often with nonnatives. 33–722 feet in elevation. Blooms June–October.	**Could Occur.** Suitable habitat is present in the IPM Program Area. The IPM Program Area is within the elevational and geographic range of the species, and there are documented occurrences within the region (CNPS 2021).
Contra Costa goldfields *Lasthenia conjugens*	E		1B.1	Alkali playa, wetland. Valley and foothill grassland, vernal pools, alkaline playas, cismontane woodland. Vernal pools, swales, low depressions, in open grassy areas. 3–1476 feet in elevation. Blooms March–June.	**Not Expected to Occur.** No suitable vernal pool habitat is present in the IPM Program Area. The IPM Program Area is within the elevational range of the species. No documented occurrences within the IPM Program Area (CNPS 2021). The Program Area is within the range of the species.
legenere *Legenere limosa*			1B.1	Vernal pools, wetland. In beds of vernal pools. 3–2887 feet in elevation. Blooms April–June.	**Not Expected to Occur.** No suitable vernal pool habitat is present in the IPM Program Area. The IPM Program Area is within the elevational range of the species. No documented occurrences within the IPM Program Area (CNPS 2021). The Program Area is within the range of the species.
Mount Hamilton coreopsis *Leptosyne hamiltonii*			1B.2	Cismontane woodland. On steep shale talus with open southwestern exposure. 1739–4265 feet in elevation. Blooms March–May.	**Could Occur.** Suitable habitat may be present in the IPM Program Area. The IPM Program Area is within the geographic, but below the elevational range of the species, and there are documented occurrences within the region (CNPS 2021).
smooth lessingia *Lessingia micradenia* var. *glabrata*			1B.2	Ultramafic. Chaparral, cismontane woodland. Serpentine; often on roadsides. 394–1378 feet in elevation. Blooms (May),(June), July–November.	**Could Occur.** Suitable habitat is present in the IPM Program Area. The IPM Program Area is within the elevational and geographic range of the species, and there are documented occurrences within the region (CNPS 2021).
Mount Hamilton lomatium *Lomatium observatorium*			1B.2	Cismontane woodland. Open to partially shaded openings in Pinus coulteri-oak woodland. Sedimentary Franciscan rocks and volcanics. 1788–4003 feet in elevation. Blooms March–May.	**Could Occur.** Suitable habitat may be present in the IPM Program Area. The IPM Program Area is within the geographic, but below the elevational range of the species, and there are documented occurrences within the region (CNPS 2021).
arcuate bush-mallow *Malacothamnus arcuatus*			1B.2	Chaparral, cismontane woodland. Gravelly alluvium. 3–2411 feet in elevation. Blooms April–September.	**Could Occur.** Suitable habitat is present in the IPM Program Area. The IPM Program Area is within the elevational and geographic range of the species, and there are documented occurrences within the region (CNPS 2021).
Hall's bush-mallow *Malacothamnus hallii*			1B.2	Ultramafic. Chaparral, coastal scrub. Some populations on serpentine. 33–2395 feet in elevation. Blooms May–September (October).	**Could Occur.** Suitable habitat is present in the IPM Program Area. The IPM Program Area is within the elevational and geographic range of the species, and there are documented occurrences within the region (CNPS 2021).

Species	Federal Status [1]	State Status [1]	CRPR Status [1]	Habitat and Blooming Period	Potential for Occurrence [2]
Oregon meconella *Meconella oregana*			1B.1	Coastal prairie, coastal scrub. Open, moist places. 197–2100 feet in elevation. Blooms March–April.	**Could Occur.** Suitable habitat is present in the IPM Program Area. The IPM Program Area is within the elevational and geographic range of the species, and there are documented occurrences within the region (CNPS 2021).
woodland woollythreads *Monolopia gracilens*			1B.2	Ultramafic. Chaparral, valley and foothill grassland, cismontane woodland, broadleafed upland forest, north coast coniferous forest. Grassy sites, in openings; sandy to rocky soils. Often seen on serpentine after burns but may have only weak affinity to serpentine. 328–3937 feet in elevation. Blooms (February), March–July.	**Could Occur.** Suitable habitat is present in the IPM Program Area. The IPM Program Area is within the elevational and geographic range of the species, and there are documented occurrences within the region (CNPS 2021).
prostrate vernal pool navarretia *Navarretia prostrata*			1B.1	Wetland. Coastal scrub, valley and foothill grassland, vernal pools, meadows and seeps. Alkaline soils in grassland, or in vernal pools. Mesic, alkaline sites. 10–4052 feet in elevation. Blooms April–July.	**Not Expected to Occur.** No suitable vernal pool habitat is present in the IPM Program Area. The IPM Program Area is within the elevational range of the species. No documented occurrences within the IPM Program Area (CNPS 2021). The Program Area is within the range of the species.
Santa Cruz Mountains beardtongue *Penstemon rattanii* var. *kleei*			1B.2	Chaparral, lower montane coniferous forest, north coast coniferous forest. Sandy shale slopes; sometimes in the transition between forest and chaparral. 1312–3609 feet in elevation. Blooms May–June.	**Could Occur.** Suitable habitat is present in the IPM Program Area. The IPM Program Area is within the geographic range , but not the elevational range of the species, and there are documented occurrences within the region (CNPS 2021).
San Benito pentachaeta *Pentachaeta exilis* ssp. *aeolica*			1B.2	Cismontane woodland, valley and foothill grassland. Grassy areas. 1198–2805 feet in elevation. Blooms March–May.	**Could Occur.** Suitable habitat is present in the IPM Program Area. The IPM Program Area is within the elevational and geographic range of the species, and there are documented occurrences within the region (CNPS 2021).
Mount Diablo phacelia *Phacelia phacelioides*			1B.2	Ultramafic. Chaparral, cismontane woodland. Adjacent to trails, on rock outcrops and talus slopes; sometimes on serpentine. 1985–4413 feet in elevation. Blooms April–May.	**Could Occur.** Suitable habitat is present in the IPM Program Area. The IPM Program Area is within the geographic range , but not the elevational range of the species, and there are documented occurrences within the region (CNPS 2021).
Yadon's rein orchid *Piperia yadonii*	E		1B.1	Closed-cone coniferous forest, chaparral, coastal bluff scrub. On sandstone and sandy soil, but poorly drained and often dry. 33–1657 feet in elevation. Blooms (February), May–August.	**Not Expected to Occur.** Suitable habitat is present in the IPM Program Area. The IPM Program Area is within the elevational range of the species. No documented occurrences within the IPM Program Area (CNPS 2021). The Program Area is outside the range of the species.
Choris' popcornflower *Plagiobothrys chorisianus* var. *chorisianus*			1B.2	Chaparral, coastal scrub, coastal prairie. Mesic sites. 49–525 feet in elevation. Blooms March–June.	**Not Expected to Occur.** Suitable habitat is present in the IPM Program Area. The IPM Program Area is within the elevational range of the species. No documented occurrences within the IPM Program Area (CNPS 2021). The Program Area is outside the range of the species.

Species	Federal Status[1]	State Status[1]	CRPR Status[1]	Habitat and Blooming Period	Potential for Occurrence[2]
San Francisco popcornflower *Plagiobothrys diffusus*		E	1B.1	Valley and foothill grassland, coastal prairie. Historically from grassy slopes with marine influence. 148–1181 feet in elevation. Blooms March–June.	Could Occur. Suitable habitat is present in the IPM Program Area. The IPM Program Area is within the elevational and geographic range of the species, and there are documented occurrences within the region (CNPS 2021).
hairless popcornflower *Plagiobothrys glaber*			1A	Salt marsh, Vernal pool, Wetland. Meadows and seeps, marshes and swamps. Coastal salt marshes and alkaline meadows. 16–591 feet in elevation. Blooms March–May.	Not Expected to Occur. Suitable habitat is absent in the IPM Program Area. The IPM Program Area is within the elevational range of the species. No documented occurrences within the IPM Program Area (CNPS 2021). The Program Area is outside the current range of the species.
warty popcornflower *Plagiobothrys verrucosus*			2B.1	Chaparral. Shale substrate. 2198–2510 feet in elevation. Blooms April–May.	Not Expected to Occur. Suitable habitat is present in the IPM Program Area. The IPM Program Area is below the elevational range of the species. No documented occurrences within the IPM Program Area (CNPS 2021). The Program Area is outside the range of the species.
Scotts Valley polygonum *Polygonum hickmanii*	E	E	1B.1	Valley and foothill grassland. Purisima sandstone or mudstone with a thin soil layer; vernally moist due to runoff. 689–755 feet in elevation. Blooms May–August.	Not Expected to Occur. Suitable habitat may be present in the IPM Program Area. The IPM Program Area is within the elevational range of the species. No documented occurrences within the IPM Program Area (CNPS 2021). The Program Area is outside the range of the species.
California alkali grass *Puccinellia simplex*			1B.2	Meadows and seeps, chenopod scrub, valley and foothill grasslands, vernal pools. Alkaline, vernally mesic. Sinks, flats, and lake margins. 3–3002 feet in elevation. Blooms March–May.	Could Occur. Suitable habitat may be present in the IPM Program Area. The IPM Program Area is within the elevational and geographic range of the species, and there are documented occurrences within the region (CNPS 2021).
rock sanicle *Sanicula saxatilis*			1B.2	Broadleafed upland forest, chaparral, valley and foothill grassland. Bedrock outcrops and talus slopes in chaparral or oak woodland habitat. 2198–4101 feet in elevation. Blooms April–May.	Could Occur. Suitable habitat is present in the IPM Program Area. The IPM Program Area is within the geographic range, but below the elevational range of the species, and there are documented occurrences within the region (CNPS 2021).
chaparral ragwort *Senecio aphanactis*			2B.2	Chaparral, cismontane woodland, coastal scrub. Drying alkaline flats. 66–2805 feet in elevation. Blooms January–April (May).	Could Occur. Suitable habitat is present in the IPM Program Area. The IPM Program Area is within the elevational and geographic range of the species, and there are documented occurrences within the region (CNPS 2021).
Metcalf Canyon jewelflower *Streptanthus albidus* ssp. *albidus*	E		1B.1	Ultramafic. Valley and foothill grassland. Relatively open areas in dry grassy meadows on serpentine soils; also on serpentine balds. 148–2625 feet in elevation. Blooms April–July.	Could Occur. Suitable habitat is present in the IPM Program Area. The IPM Program Area is within the elevational and geographic range of the species, and there are documented occurrences within the region (CNPS 2021).

Species	Federal Status [1]	State Status [1]	CRPR Status [1]	Habitat and Blooming Period	Potential for Occurrence [2]
most beautiful jewelflower *Streptanthus albidus* ssp. *peramoenus*			1B.2	Ultramafic. Chaparral, valley and foothill grassland, cismontane woodland. Serpentine outcrops, on ridges and slopes. 312–3281 feet in elevation. Blooms (March), April–September (October).	**Could Occur.** Suitable habitat is present in the IPM Program Area. The IPM Program Area is within the elevational and geographic range of the species, and there are documented occurrences within the region (CNPS 2021).
Mount Hamilton jewelflower *Streptanthus callistus*			1B.3	Chaparral, cismontane woodland. Open talus slopes on shale with gray pine and/or black oak. 1969–2592 feet in elevation. Blooms April–May.	**Could Occur.** Suitable habitat is present in the IPM Program Area. The IPM Program Area is within geographic, but below the elevational range of the species, and there are documented occurrences within the region (CNPS 2021).
two-fork clover *Trifolium amoenum*	E		1B.1	Valley and foothill grassland, coastal bluff scrub. Sometimes on serpentine soil, open sunny sites, swales. Most recently cited on roadside and eroding cliff face. 16–1017 feet in elevation. Blooms April–June.	**Not Expected to Occur.** Suitable habitat is present in the IPM Program Area. The IPM Program Area is within the elevational range of the species. No documented occurrences within the IPM Program Area (CNPS 2021). The Program Area is outside the current range of the species.
Santa Cruz clover *Trifolium buckwestiorum*			1B.1	Coastal prairie, broadleafed upland forest, cismontane woodland. Moist grassland. Gravelly margins. 344–2001 feet in elevation. Blooms April–October.	**Could Occur.** Suitable habitat is present in the IPM Program Area. The IPM Program Area is within the elevational and geographic range of the species, and there are documented occurrences within the region (CNPS 2021).
saline clover *Trifolium hydrophilum*			1B.2	Wetland. Marshes and swamps, valley and foothill grassland, vernal pools. Mesic, alkaline sites. 0–984 feet in elevation. Blooms April–June.	**Not Expected to Occur.** No suitable vernal pool habitat is present in the IPM Program Area. The IPM Program Area is within the elevational range of the species. No documented occurrences within the IPM Program Area (CNPS 2021). The Program Area is within the range of the species.
Pacific Grove clover *Trifolium polyodon*			1B.1	Wetland. Closed-cone coniferous forest, meadows and seeps, coastal prairie, valley and foothill grassland. Along small springs and seeps in grassy openings. 16–394 feet in elevation. Blooms April–June (July).	**Could Occur.** Suitable habitat is present in the IPM Program Area. The IPM Program Area is within the elevational and geographic range of the species; however, there are no documented occurrences within the region (CNPS 2021).

Notes: CRPR = California Rare Plant Rank; CNPS California Native Plant Society; ESA = Federal Endangered Species Act; CESA = California Endangered Species Act;

[1] Legal Status Definitions

Federal :

E Endangered (legally protected by ESA)
T Threatened (legally protected by ESA)
C Candidate (legally protected by ESA)

State:

E Endangered (legally protected by CESA)
T Threatened (legally protected by CESA)

California Rare Plant Ranks:

1B Plant species considered rare or endangered in California and elsewhere (protected under CEQA, but not legally protected under ESA or CESA)
2 Plant species considered rare or endangered in California but more common elsewhere (protected under CEQA, but not legally protected under ESA or CESA)

Threat Ranks

0.1-Seriously threatened in California (over 80% of occurrences threatened / high degree and immediacy of threat)

0.2-Moderately threatened in California (20-80% occurrences threatened / moderate degree and immediacy of threat)

[2] Potential for Occurrence Definitions

Not expected to occur: Species is unlikely to be present on the project site due to poor habitat quality, lack of suitable habitat features, or restricted current distribution of the species.

Could occur: Suitable habitat is available at the project site; however, there are little to no other indicators that the species might be present.

Known to occur: The species, or evidence of its presence, was observed at the project site during reconnaissance surveys, or was reported by others.

Sources: Authority 2010; CNPS 2021;

Table C-2 Special-Status Animal Species Known to Occur in the Project Region and their Potential for Occurrence in the Program Area

Species	Federal Status [1]	State Status [1]	Other Status [1]	Habitat	Potential for Occurrence [2]
Invertebrates					
Bay checkerspot butterfly *Euphydryas editha bayensis*	T			Coastal dunes, ultramafic, valley and foothill grassland. Restricted to native grasslands on outcrops of serpentine soil in the vicinity of San Francisco Bay. *Plantago erecta* is the primary host plant; *Orthocarpus densiflorus* and *O. purpurscens* are the secondary host plants.	**Known to Occur.** Suitable habitat is present with the IPM Program Area. The IPM Program Area is within the range of the species and the species is known to occur within the Program Area (CNDDB 2021).
Crotch bumble bee *Bombus crotchii*		S1S2*		Coastal California east to the Sierra-Cascade crest and south into Mexico. Food plant genera include *Antirrhinum, Phacelia, Clarkia, Dendromecon, Eschscholzia*, and *Eriogonum*.	**Could Occur.** Suitable habitat for the species is present within the IPM Program Area. Species documented to occur near IPM Program area in 2019 and 2020 (CNDDB 2021).
western bumble bee *Bombus occidentalis*		S1S2*		Bumble bees have three basic habitat requirements: suitable nesting sites for the colonies, availability of nectar and pollen from floral resources throughout the duration of the colony period (spring, summer, and fall), and suitable overwintering sites for the queens.	**Not Expected to Occur.** Suitable habitat for the species is present within the IPM Program Area; However, there have been no documented occurrences within Santa Clara County since 1979 (CNDDB 2021). The IPM Program Area is outside of the current range of the species (CDFW 2018).
Ohlone tiger beetle *Cicindela ohlone*	FE			Coastal prairie. Remnant native grasslands with California oatgrass and purple needlegrass in Santa Cruz County. Substrate is poorly-drained clay or sandy clay soil over bedrock of Santa Cruz mudstone.	**Not Expected to Occur.** The IPM Program Area is outside of the range of the species (CDFW 2019), which is restricted to Santa Cruz County.
Monarch -California overwintering population *Danaus plexippus*	C			Winter roost sites extend along the coast from northern Mendocino to Baja California, Mexico. Roosts located in wind-protected tree groves (eucalyptus, Monterey pine, cypress), with nectar and water sources nearby.	**Could Occur.** Overwintering roost sites for monarchs are found an average of 1.5 miles from the coast, which makes it unlikely that the species overwinters in the IPM Program Area. However, the species is known to occur within the IPM Program Area during the breeding season (Western Monarch and Milkweed Mapper 2021).
Smith's blue butterfly *Euphilotes enoptes smithi*	E			Coastal dunes, coastal scrub. Most commonly associated with coastal dunes and coastal sage scrub plant communities in Monterey and Santa Cruz counties. Hostplant: *Eriogonum latifolium* and *Eriogonum parvifolium* are utilized as both larval and adult foodplants.	**Not Expected to Occur.** Coastal scrub habitat is present within the IPM Program Area; however, the IPM Program area is outside of the range of the species (USFWS 2019).

Species	Federal Status [1]	State Status [1]	Other Status [1]	Habitat	Potential for Occurrence [2]
Zayante band-winged grasshopper *Trimerotropis infantilis*	E			Chaparral, interior dunes. Isolated sandstone deposits in the Santa Cruz Mountains (the Zayante Sand Hills ecosystem) Mostly on sand parkland habitat but also in areas with well-developed ground cover and in sparse chaparral with grass.	**Not Expected to Occur.** Suitable habitat for the species is present within the IPM Program area. The species is documented to occur historically within the Santa Clara County near Lexington Reservoir. However, that historic occurrence was extirpated by construction of the reservoir, and there have been no documented occurrences within Santa Clara County since 1928 (CNDDB 2021).
Fish					
coho salmon - central California coast ESU *Oncorhynchus kisutch* pop. 4	E	E		Federal listing = pops between Punta Gorda and San Lorenzo River. State listing includes populations south of Punta Gorda. Require beds of loose, silt-free, coarse gravel for spawning. Also need cover, cool water and sufficient dissolved oxygen.	**Not Expected to Occur.** Potentially suitable habitat occurs within Alum Rock Creek, Coyote Creek and its tributaries within the IPM Program Area; however, there are no documented occurrences within the IPM Program Area (CNDDB 2021) and the IPM Program Area is outside of the current range of the species (Cal Trout 2019).
Monterey hitch *Lavinia exilicauda harengus*		SC		Found in the Pajaro River basin and Salinas River system in low-gradient streams with permanent water and large pools. Known to occur in lower Uvas, Llagas, and Pacheco Creeks.	**Known to Occur.** Suitable stream habitat and known occurrence directly adjacent to the IPM Program Area (CNDDB 2021).
Monterey roach *Lavinia symmetricus subditus*		SC		Sacramento/San Joaquin flowing waters, South coast flowing waters. Tributaries to Monterey Bay, specifically the Salinas, Pajaro, and San Lorenzo drainages.	**Could Occur.** Suitable stream habitat within IPM Program area. Documented to occur within Llagas Creek outside of the IPM Program Area (CNDDB 2021).
steelhead - central California coast DPS *Oncorhynchus mykiss irideus* pop. 8	T			Sacramento/San Joaquin flowing waters. From Russian River, south to Soquel Creek and to, but not including, Pajaro River. Also San Francisco and San Pablo Bay basins.	**Could Occur.** Suitable stream habitat within the IPM Program area along Alum Rock Creek and adjacent to the IPM Program Area within Coyote Creek. This habitat is also designated Critical habitat (NOAA 2019).
steelhead - south-central California coast DPS *Oncorhynchus mykiss irideus* pop. 9	T			Sacramento/San Joaquin flowing waters. South coast flowing waters. Federal listing refers to runs in coastal basins from the Pajaro River south to, but not including, the Santa Maria River.	**Could Occur.** Suitable stream habitat directly adjacent to the IPM Program area along the Pajaro River. This habitat is also designated Critical habitat (NOAA 2019).
Amphibians and Reptiles					
Alameda whipsnake *Masticophis lateralis euryxanthus*	T	T		Chaparral, cismontane woodland, coastal scrub, valley and foothill grassland. Typically found in chaparral and scrub habitats but will also use adjacent grassland, oak savanna and woodland habitats. Mostly south-facing slopes and ravines, with rock outcrops, deep crevices or abundant rodent burrows, where shrubs form a vegetative mosaic with oak trees and grasses.	**Could Occur.** Suitable habitat is present within the IPM Program Area for this species. IPM Program Area is at the southern edge of the range of the species.

Species	Federal Status [1]	State Status [1]	Other Status [1]	Habitat	Potential for Occurrence [2]
California giant salamander *Dicamptodon ensatus*		SC		Aquatic, meadow and seep, north coast coniferous forest, and riparian forest. Known from wet coastal forests near streams and seeps from Mendocino County south to Monterey County and east to Napa County. Aquatic larvae found in cold, clear streams, occasionally in lakes and ponds. Adults known from wet forests under rocks and logs near streams and lakes.	**Could Occur.** Suitable habitat is present within the IPM Program Area for this species. IPM Program Area is within the range of the species.
California glossy snake *Arizona elegans occidentalis*		SC		Patchily distributed from the eastern portion of San Francisco bay, southern San Joaquin Valley, and the Coast, Transverse, and Peninsular Ranges south to Baja California. Generalist reported from a range of scrub and grassland habitats, often with loose or sandy soils.	**Not Likely to Occur.** Suitable habitat present within the IPM Program Area; however, Program Area is outside of the known range of the species.
California red-legged frog *Rana draytonii*	T	SC		Aquatic, artificial flowing waters, artificial standing waters, freshwater marsh, marsh & swamp, riparian forest, riparian scrub, riparian woodland, Sacramento/San Joaquin flowing waters, Sacramento/San Joaquin standing waters, south coast flowing waters. Lowlands and foothills in or near permanent sources of deep water with dense, shrubby or emergent riparian vegetation. Requires 11-20 weeks of permanent water for larval development. Must have access to estivation habitat.	**Known to Occur.** Suitable habitat is present with the IPM Program Area. The IPM Program Area is within the range of the species and the species is known to occur (CNDDB 2021).
California tiger salamander *Ambystoma californiense*	T	T		Cismontane woodland, meadow and seep, riparian woodland, valley and foothill grassland, vernal pool, and wetlands. Central Valley DPS federally listed as threatened. Santa Barbara and Sonoma counties DPS federally listed as endangered. Need underground refuges, especially ground squirrel burrows, and vernal pools or other seasonal water sources for breeding.	**Known to Occur.** Suitable habitat is present with the IPM Program Area. Program activities are anticipated to occur within the range of the species and the species is known to occur within the Program Area (CNDDB 2021).
coast horned lizard *Phrynosoma blainvillii*		SC		Chaparral, cismontane woodland, coastal bluff scrub, coastal scrub, desert wash, pinyon and juniper woodlands, riparian scrub, riparian woodland, valley and foothill grassland. Frequents a wide variety of habitats, most common in lowlands along sandy washes with scattered low bushes. Open areas for sunning, bushes for cover, patches of loose soil for burial, and abundant supply of ants and other insects.	**Could Occur.** Suitable habitat is present within the IPM Program Area for this species, and the Program Area is within the range of the species.
coast Range newt *Taricha torosa*		SC		Coastal drainages from Mendocino County to San Diego County. Lives in terrestrial habitats and will migrate over 0.6 mile to breed in ponds, reservoirs and slow moving streams.	**Could Occur.** Suitable habitat is present within the IPM Program Area for this species, and the Program Area is within the range of the species.

Species	Federal Status [1]	State Status [1]	Other Status [1]	Habitat	Potential for Occurrence [2]
foothill yellow-legged frog *Rana boylii*		CE		Aquatic, chaparral, cismontane woodland, coastal scrub, Klamath/north coast flowing waters, lower montane coniferous forest, meadow and seep, riparian forest, riparian woodland, and Sacramento/San Joaquin flowing waters. Partly-shaded, shallow streams and riffles with a rocky substrate in a variety of habitats. Need at least some cobble-sized substrate for egg-laying. Need at least 15 weeks to attain metamorphosis.	Known to Occur: Suitable aquatic habitat is present within the IPM Program Area for this species. IPM activities are anticipated to occur within the range of the species and the species is known to occur within the IPM Program Area (CNDDB 2021).
Northern California legless lizard *Anniella pulchra*		SC		Chaparral. Coastal dunes. Coastal scrub. Sandy or loose loamy soils under sparse vegetation. Soil moisture is essential. They prefer soils with a high moisture content.	Could Occur. Suitable habitat is present within the IPM Program Area and the IPM Program Area is within the known range of the species. Historic occurrence within the Program Area from 1946 (CNDDB 2021).
Santa Cruz black salamander *Aneides niger*		SC		Mixed deciduous and coniferous woodlands and coastal grasslands in San Mateo, Santa Cruz, and Santa Clara counties. Adults found under rocks, talus, and damp woody debris.	Could Occur. Suitable habitat is present within the IPM Program Area for this species, and the Program Area is within the range of the species.
western pond turtle *Actinemys marmorata*		SC		Aquatic, artificial flowing waters, Klamath/north coast flowing waters, Klamath/north coast standing waters, marsh & swamp, Sacramento/San Joaquin flowing waters, Sacramento/San Joaquin standing waters, South coast flowing and standing waters. A thoroughly aquatic turtle of ponds, marshes, rivers, streams and irrigation ditches, usually with aquatic vegetation, below 6,000 feet elevation. Need basking sites and suitable (sandy banks or grassy open fields) upland habitat up to 0.5 km from water for egg-laying.	Known to Occur. Suitable habitat is present with the IPM Program Area. Program activities are anticipated to occur within the range of the species and the species is known to occur within the IPM Program Area (CNDDB 2021).
Birds					
American peregrine falcon *Falco peregrinus anatum*	D	D FP		Near wetlands, lakes, rivers, or other water; on cliffs, banks, dunes, mounds; also, human-made structures. Nest consists of a scrape or a depression or ledge in an open site.	Could Occur. No suitable nesting habitat within preserve; however, suitable foraging habitat is present. Documented to occur within the Santa Cruz Mountains north of the IPM Program Area (CNDDB 2021).
bald eagle *Haliaeetus leucocephalus*	D	E FP		Lower montane coniferous forest, old growth. Ocean shore, lake margins, and rivers for both nesting and wintering. Most nests within 1 mile of water. Nests in large, old-growth, or dominant live tree with open branches, especially ponderosa pine. Roosts communally in winter.	Could Occur. Suitable nesting habitat within IPM Program Area. Suitable foraging habitat directly adjacent to IPM Program Area. Documented to occur within Santa Clara County outside of the IPM Program Area (CNDDB 2021).
bank swallow *Riparia riparia*		T		Riparian scrub, riparian woodland. Colonial nester; nests primarily in riparian and other lowland habitats west of the desert. Requires vertical banks/cliffs with fine-textured/sandy soils near streams, rivers, lakes, ocean to dig nesting hole.	Could Occur. Suitable nesting habitat within and suitable foraging habitat directly adjacent to IPM Program Area. Documented to occur historically within Santa Clara County outside of the IPM Program Area (CNDDB 2021).

Species	Federal Status[1]	State Status[1]	Other Status[1]	Habitat	Potential for Occurrence[2]
black swift *Cypseloides niger*		SC		Coastal belt of Santa Cruz and Monterey Co; central and southern Sierra Nevada; San Bernardino and San Jacinto Mountains. Breeds in small colonies on cliffs behind or adjacent to waterfalls in deep canyons and sea-bluffs above the surf; forages widely	Not Expected to Occur: No suitable habitat for the species is present within the IPM Program Area. Program Area is outside of the known range of the species.
burrowing owl *Athene cunicularia*		SC		Coastal prairie, coastal scrub, Great Basin grassland, Great Basin scrub, Mojavean desert scrub, Sonoran desert scrub, and valley and foothill grassland. Open, dry annual or perennial grasslands, deserts and scrublands characterized by low-growing vegetation. Subterranean nester, dependent upon burrowing mammals, most notably, the California ground squirrel.	Known to Occur. Suitable habitat is present with the IPM Program Area. IPM activities are anticipated to occur within the range of the species and the species is known to occur within the IPM Program Area (CNDDB 2021).
golden eagle *Aquila chrysaetos*		FP		Broadleaved upland forest, cismontane woodland, coastal prairie, Great Basin grassland, Great Basin scrub, lower montane coniferous forest, pinyon and juniper woodlands, upper montane coniferous forest, and valley and foothill grassland. Rolling foothills, mountain areas, sage-juniper flats, and desert. Cliff-walled canyons provide nesting habitat in most parts of range; also, large trees in open areas.	Known to Occur. Suitable habitat is present with the IPM Program Area. IPM activities are anticipated to occur within the range of the species and the species is known to occur within the IPM Program Area (CNDDB 2021).
grasshopper sparrow *Ammodramus savannarum*		SC		Valley and foothill grassland. Dense grasslands on rolling hills, lowland plains, in valleys and on hillsides on lower mountain slopes. Favors native grasslands with a mix of grasses, forbs and scattered shrubs. Loosely colonial when nesting.	Known to Occur. Suitable habitat is present with the IPM Program Area. Program activities are anticipated to occur within the range of the species and the species is known to occur within the IPM Program Area (CNDDB 2021).
least Bell's vireo *Vireo bellii pusillus*	E	E		Riparian forest, riparian scrub, riparian woodland. Summer resident of Southern California in low riparian in vicinity of water or in dry river bottoms; below 2,000 feet. Nests placed along margins of bushes or on twigs projecting into pathways, usually willow, Baccharis, mesquite.	Could Occur. The IPM Program Area contains suitable nesting and foraging habitat for this species. Known to occur directly adjacent to the Pajaro River Agricultural Preserve (CNDDB 2021).
loggerhead shrike *Lanius ludovicianus*		SC		Broadleaved upland forest, desert wash, Joshua tree woodland, Mojavean desert scrub, pinyon and juniper woodlands, riparian woodland, Sonoran desert scrub. Broken woodlands, savannah, pinyon-juniper, Joshua tree, and riparian woodlands, desert oases, scrub and washes. Prefers open country for hunting, with perches for scanning, and fairly dense shrubs and brush for nesting.	Known to Occur. Suitable nesting and foraging habitat is present with the IPM Program Area. Program activities are anticipated to occur within the range of the species and the species is known to occur within the IPM Program Area (CNDDB 2021).
purple martin *Progne subis*		SC		Broadleaved upland forest, lower montane coniferous forest. Inhabits woodlands, low elevation coniferous forest of Douglas-fir, ponderosa pine, and Monterey pine. Nests in old woodpecker cavities mostly, also in human-made structures. Nest often located in tall, isolated tree/snag.	Could Occur. Suitable nesting and foraging habitat within IPM Program Area Documented to occur within Santa Clara County outside of the IPM Program Area (CNDDB 2021).

Species	Federal Status [1]	State Status [1]	Other Status [1]	Habitat	Potential for Occurrence [2]
Swainson's hawk *Buteo swainsoni*		T		Great Basin grassland, riparian forest, riparian woodland, valley and foothill grassland. Breeds in grasslands with scattered trees, juniper-sage flats, riparian areas, savannahs, and agricultural or ranch lands with groves or lines of trees. Requires adjacent suitable foraging areas such as grasslands, or alfalfa or grain fields supporting rodent populations.	**Could Occur.** Suitable nesting habitat and foraging habitat within IPM Program Area. Documented to occur within Santa Clara County outside of the IPM Program Area (CNDDB 2021).
tricolored blackbird *Agelaius tricolor*		T SC		Freshwater marsh, marsh and swamp, swamp, wetland. Highly colonial species, most numerous in Central Valley and vicinity. Largely endemic to California. Requires open water, protected nesting substrate, and foraging area with insect prey within a few kilometers of the colony.	**Could Occur.** Suitable nesting habitat and foraging habitat within IPM Program Area. Documented to occur within Santa Clara County outside of the IPM Program Area (CNDDB 2021).
white-tailed kite *Elanus leucurus*		FP		Cismontane woodland, marsh and swamp, riparian woodland, valley and foothill grassland, and wetlands. Rolling foothills and valley margins with scattered oaks and river bottomlands or marshes next to deciduous woodland. Open grasslands, meadows, or marshes for foraging close to isolated, dense-topped trees for nesting and perching.	**Could Occur.** Suitable nesting habitat and foraging habitat within IPM Program Area. Documented to occur within Santa Clara County outside of the IPM Program Area (CNDDB 2021).
yellow rail *Coturnicops noveboracensis*		SC		Freshwater marsh, meadow and seep. Summer resident in eastern Sierra Nevada in Mono County. Fresh-water marshlands.	**Not Expected to Occur.** No suitable habitat within the IPM Program Area. Documented occurrences within northern Santa Clara County (CNDDB 2021).
yellow-breasted chat *Icteria virens*		SC		Riparian forest, riparian scrub, riparian woodland. Summer resident; inhabits riparian thickets of willow and other brushy tangles near watercourses. Nests in low, dense riparian, consisting of willow, blackberry, wild grape; forages and nests within 10 feet of ground.	**Could Occur.** Suitable nesting habitat and foraging habitat within IPM Program Area. Documented to occur within Santa Clara County outside of the IPM Program Area (CNDDB 2021).
Mammals					
American badger *Taxidea taxus*		SC		Alkali marsh, alkali playa, alpine, alpine dwarf scrub, bog a fen, brackish marsh, broadleaved upland forest, chaparral, chenopod scrub, cismontane woodland, closed-cone coniferous forest, coastal bluff scrub, coastal dunes, coastal prairie. Most abundant in drier open stages of most shrub, forest, and herbaceous habitats, with friable soils. Needs sufficient food, friable soils and open, uncultivated ground. Preys on burrowing rodents. Digs burrows.	**Could Occur.** Suitable denning and foraging habitat within IPM Program Area. Documented to occur within Santa Clara County outside of the IPM Program Area (CNDDB 2021).
hoary bat *Lasiurus cinereus*			WBWG: M	Broadleaved upland forest, cismontane woodland, lower montane coniferous forest, north coast coniferous forest. Prefers open habitats or habitat mosaics, with access to trees for cover and open areas or habitat edges for feeding. Roosts in dense foliage of medium to large trees. Feeds primarily on moths. Requires water.	**Could Occur.** Suitable roosting and foraging habitat within IPM Program area. Documented to occur historically (1990) within Santa Clara County outside of the IPM Program Area. (CNDDB 2021).

Species	Federal Status [1]	State Status [1]	Other Status [1]	Habitat	Potential for Occurrence [2]
long-eared myotis *Myotis evotis*			WBWG: M	Found in all brush, woodland and forest habitats from sea level to about 9,000 feet prefers coniferous woodlands and forests. Nursery colonies in buildings, crevices, spaces under bark, and snags. Caves used primarily as night roosts.	**Could Occur.** Suitable roosting and foraging habitat within IPM Program area. Documented to occur within Santa Clara County outside of the IPM Program Area (CNDDB 2021).
Mountain lion-Southern California/Central Coast evolutionary significant unit *Puma concolor*		CT		Found in most habitats within Central California. Uses caves, other natural cavities, and brush thickets for cover and denning often within riparian habitats.	**Known to Occur.** Suitable habitat for foraging, cover, and reproduction occurs the IPM Program Area. Documented to occur within Santa Clara County and the IPM Program Area (Santa Cruz Puma Project 2021).
pallid bat *Antrozous pallidus*		SC		Chaparral, coastal scrub, desert wash, Great Basin grassland, Great Basin scrub, Mojavean desert scrub, riparian woodland, Sonoran desert scrub, upper montane coniferous forest, valley and foothill grassland. Deserts, grasslands, shrublands, woodlands and forests. Most common in open, dry habitats with rocky areas for roosting. Roosts must protect bats from high temperatures. Very sensitive to disturbance of roosting sites.	**Could Occur.** Suitable roosting and foraging habitat within IPM Program Area. Documented to occur within Santa Clara County outside of the IPM Program Area (CNDDB 2021).
ringtail *Bassariscus astutus*		FP		Riparian habitats, forest habitats, and shrub habitats in lower to middle elevations. Usually found within 0.6 mile of a permanent water source.	**Could Occur:** Species is not tracked in CNDDB. Documented to be relatively common in the region (Santa Clara County et al. 2012). Suitable riparian and woodland habitat within the IPM Program Area.
San Francisco dusky-footed woodrat *Neotoma fuscipes annectens*		SC		Chaparral, redwood. Forest habitats of moderate canopy and moderate to dense understory. May prefer chaparral and redwood habitats. Constructs nests of shredded grass, leaves and other material. May be limited by availability of nest-building materials.	**Known to Occur:** Suitable forested habitat for the species occurs in the IPM Program Area. Documented to occur within the IPM Program Area (Authority 2010).
San Joaquin kit fox *Vulpes macrotis mutica*	E	T		Chenopod scrub, valley and foothill grassland. Annual grasslands or grassy open stages with scattered shrubby vegetation. Need loose-textured sandy soils for burrowing, and suitable prey base.	**Could Occur:** Suitable habitat occurs within the IPM Program Area. Historic documented occurrence within the IPM Program Area (1975), and IPM Program Area is within the range of the species (Stafford 2008).
Townsend's big-eared bat *Corynorhinus townsendii*		SC		Broadleaved upland forest, chaparral, chenopod scrub, Great Basin grassland, Great Basin scrub, Joshua tree woodland, lower montane coniferous forest, meadow & seep, Mojavean desert scrub, riparian forest, riparian woodland, Sonoran desert scrub. Throughout California in a wide variety of habitats. Most common in mesic sites. Roosts in the open, hanging from walls and ceilings. Roosting sites limiting. Extremely sensitive to human disturbance.	**Could Occur.** Suitable roosting and foraging habitat within IPM Program Area. Documented to occur within Santa Clara County outside of the IPM Program Area (CNDDB 2019).

Note: CNDDB = California Natural Diversity Database; USFWS = U.S. Fish and Wildlife Service; ESU = Evolutionary Significant Unit; DPS= Distinct Population Segment

* These species are included as special-status species due to there previous listing as Candidate Endangered by the California Fish and Game Commission. This candidate status was overturned by the courts in 2020; however, the species still warrants consideration under CEQA (see Section 3.3, Biological Resources).

[1] Legal Status Definitions

Federal:

E	Endangered (legally protected)
T	Threatened (legally protected)
C	Candidate (no formal protection)

State:

FP	Fully protected (legally protected)
SC	Species of special concern (no formal protection other than CEQA consideration)
CE	Candidate Endangered (legally protected)
E	Endangered (legally protected)
T	Threatened (legally protected)
S1	Critically Imperiled (no formal protection other than CEQA consideration)
S2	Imperiled (no formal protection other than CEQA consideration)

Other:

WBWG: M Western Bat Working Group - Medium

[2] Potential for Occurrence Definitions

Not expected to occur: Species is unlikely to be present in the project area due to poor habitat quality, lack of suitable habitat features, or restricted current distribution of the species.

Could occur: Suitable habitat is available in the project area; however, there are little to no other indicators that the species might be present.

Known to occur: The species, or evidence of its presence, has been reported by others.

Source: Authority 2010; CNDDB 2021; Western Monarch and Milkweed Mapper 2021; Santa Cruz Puma Project 2021; Stafford 2008; Santa Clara County et al. 2012; USFWS 2019

Appendix HAZ-1

Technical Pesticide Toxicity Evaluation

Technical Pesticide Toxicity Evaluation

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HAZARD APPENDIX

Introduction-Pesticide Overview

This document has been prepared to evaluate the pesticides proposed for use under the Integrated Pest Management Program (IPM Program) proposed by the Santa Clara Valley Open Space Authority (Authority), by analyzing the potential for direct and indirect effects from pesticide use to human health, wildlife, and the environment.

Products developed to control vegetation are referred to as herbicides, products to control insects are referred to as insecticides, and products developed to control rodent pests are referred to as rodenticides. The terms pesticide and chemical are used to describe herbicides, insecticides, and rodenticides and are used interchangeably in this document. Under the proposed IPM Program, each of these pesticide products are proposed for use in different management categories, these include natural lands, agricultural lands, recreational facilities, and buildings and structures. Because of the Authority's careful use of the chemicals listed in this document, it is expected that exposures will be relatively low and not result in adverse effects to applicators or the public.

Throughout this document, the evaluation of risks presented are based on the relationship between documented toxicity of an active ingredient (a.i.) and estimates of possible exposure associated with pesticide application. This is a standard method used to provide an estimated risk of chemicals to selected target and non-target biota.

Risk = Fn (exposure x toxicity)

HQ = exposure/acceptable level of toxicity (where 1.0 is the initial point of concern)

As the exposure level decreases, the margin of safety increases. This approach is typically used in USEPA risk assessments. A hazard quotient (HQ) is the ratio of a projected level of exposure divided by some index of an acceptable exposure or an exposure associated with a defined risk. As the level of projected exposure decreases, the HQ decreases. Because the parameters used to develop risk estimates generally have a large range of potential values and uncertainties, the use of the HQ of 1.0 is very conservative and usually includes large internal safety factors. As a result, the HQ may be considerably larger than 1.0 and the risk estimates used to determine adverse effects to receptors of concern may not be realistic. In the following evaluations of chemicals used or proposed by the Authority, the values included for HQ and/or toxicity are usually based on laboratory test data that are not particularly realistic when the actual field application scenarios are considered. For this reason, the narratives provided for the IPM Program chemicals should be considered worst case scenarios.

Even highly hazardous chemicals can have little risk if the potential exposure is minimal. This is the basis for the information on the label provided for a chemical and reflects the ways to minimize potential exposure. The evaluations of toxicity in this document address the potential hazard of each chemical but the potential risk is clearly modified by the careful adherence to the restrictions and recommendations provided on the label and Material Safety Data Sheets (MSDS) provided by the chemical company. Generally, regulators and others tracking potential issues of exposure to toxic chemicals use a concept of the Level of Concern (LOC) which is included in many of the evaluations in this document. This value is a comparison of the expected exposure of a chemical to levels that remain at safe levels. Similar to the HQ, the LOC provides a quick look at the potential risk of an activity that includes the chemical.

This document is intended to provide descriptions and characteristics of the pesticides proposed for use under the IPM Program, as well as quickly accessible tables and definitions with succinct information about the relative hazards of each of the pesticide products proposed for use. This document includes the latest information needed to evaluate the safety of the base chemical, including active ingredients and current formulations. In many cases the formulated pesticides being evaluated herein have additives such as surfactants and emollients used to increase the effectiveness of the pesticide. Where these additives may substantially alter potential adverse effects, they are included in this evaluation.

The pesticides proposed for use under the IPM Program include some compounds that pose little or no risk because they are based on generally inert or natural substances These products are considered 'Common Products' in the evaluations. These products are included in a section that includes the basic hazard information but do not require nor have relevant toxicity information available. The list of pesticides proposed for use under the IPM Program are included in the columns below.

Herbicides:
Capstone (aminopyralid + triclopyr amine)
Milestone (aminopyralid)
Dimension (dithiopyr)
Envoy-(clethodim)
Gallery (isoxaben)
Glyphosate (active ingredient)
Polaris/Stalker (imazapyr)
Roundup Pro Product (glyphosate)
Scythe (pelargonic acid)
Telar (clorsulfuron)
Transline (clopyralid)
Vista XRT (fluroxypyr)
Dimethylamine salt (2,4-D)

Rodenticide
Cholecalciferol Baits (cholecalciferol)

Insecticides
Advion Gel (Indoxacarb)
Gentrol (Hydroprene)
Maxforce Bait (Fipronil)
Wasp Freeze (Pyrethrin)

Common Products
Diatomaceous earth (silica)
Garden Safe (Insecticidal Soap Spray)
Tero (Boric Acid)
Weed Zap (cinnamon clove/essential oils)

Proposed Use Scenarios of Chemical Products

Herbicides

Chemical control of annual and biennial weeds includes two strategies to treat different life stages: 1) post-emergent (i.e., direct application of herbicide to eliminate the plant), and 2) pre-emergent (i.e., treatment to prevent the germination of seeds). Herbicides are also classified as either selective or non-selective. Selective herbicides control plants in specific plant families or life stages, while allowing other plants to survive uninjured. Utilizing selective herbicides can be a powerful tool in balancing active management with protecting desirable, native vegetation types. Non-selective herbicides and application methods injure all plant species that are directly exposed to treatment, so should be directed only to the target species. Selectivity may be based on either the chemistry of the herbicide but can also reduce non-target exposures with the timing of the application. All of the herbicides listed above could be used to control invasive plants on natural lands. Application methods would include cut-stump, spraying either by hand or from a boom on an all-terrain vehicle, or by wicking. No aerial applications are proposed under the IPM Program.

Rodenticides

Cholecalciferol (Vitamin D3) is a rodenticide product proposed for control of rodent pests. Cholecalciferol is a natural form of Vitamin D that is especially toxic to rodents and a single dose of toxicant acts as an acute poison. It is the only current rodenticide in California labeled for organic food production. It is considered a low risk for secondary poisoning in wildlife but can be a hazard to non-target pets that directly consume the bait. Rodenticides would only be used in proven tamper-proof anchored containers under the IPM Program.

Insecticides
Insecticide products are designed to impact specific life histories of insect species, including two major groups: systemic insecticides, which have residual or long term activity; and contact insecticides, which have no residual activity. The IPM Program proposes use of natural insecticides, such as pyrethroids made by plants as defenses against insects. Other insecticide products include organic insecticides, which require contact with the pest, and some products that are repellents.

Approach:

Descriptions of the chemicals in this document include information currently known about the toxicity, ingredients, and additives associated with each of the chemicals and the potential impact to humans and wildlife. Due to the number of different potential application scenarios, it is not feasible to provide hazard evaluations for specific application techniques in specific project areas under the IPM Program. Rather, the hazard discussions are based on reports and guidance in U.S. Environmental Protection Agency (USEPA) toxicity tables included in chemical regulatory documents and appropriate studies provided in support of chemical registration. Wildlife data published as toxicity estimates are in USEPA registrant files (USEPA 2016) and exposure and toxicity tables in the Wildlife Exposure Handbooks, Volume 1 and 2.

Extensive searches on the chemical properties and toxicity of each of the pesticides proposed for use under the IPM Program were conducted to obtain recent information on potential toxicity and adverse effects to human health and wildlife, including aquatic life. Where recent, relevant information has been identified in in the Agency for Toxic Substances and Disease Registry (ATSDR ToxFAQs chemical fact sheets) and new registration information from USEPA, it is included where appropriate. Examples of some of the available databases and search engines that were considered and queried or referenced are listed below:

- BIODEG (degradation);
- CCRIS (Chemical Carcinogenesis Research Info System);
- CHEMFATE (environmental fate);
- Environmental Peer Reviewed Journals and Publications
- ECOTOX (toxicity to fish and aquatic life);
- EXTOXNET (Extension Toxicology Network's pesticide information project).
- HSDB (Hazardous Substances Data Bank);
- Institute of medicine
- IRIS (Integrated Risk Information System; toxicity to human health);
- Material Safety Data Sheet (MSDS) for each chemical
- National academy of engineering
- National academy of sciences
- National library of Medicine (PubChem); and
- National research council
- U.S. EPA Archives of Registrant's Toxicology Profiles
- U.S. EPA RED and chemical review databases;
- Wildlife Exposures Handbook V1 & V2.

All chemicals developed for vector control must be evaluated to determine their inherent toxicity and the potential adverse impacts to humans and wildlife. Thousands of studies have been conducted by the manufacturers, research scientists, and regulatory agencies. These studies and the reports generated provide the basic information used in this document.

The degree of toxicity of a pesticide determines what precautions *must appear on the pesticide label*. These should always be considered by the users and include, for example:

- The "signal word" (caution, warning, danger).
- The first aid recommendations. The use and type of protective clothing and whether the pesticide may be used only by specially trained and certified applicators (restricted use pesticides).

The potential toxicity characteristics to humans for the chemicals proposed for use under the IPM Program are provided in the table below and as an additional information sheet for use in the field. Because it is neither ethical nor practical to conduct toxicity evaluations using humans, the historic approach has been to substitute rats, rabbits, dogs, and other animals as surrogate test animals. Nearly all data provided in the open literature characterizing chemical effects to humans are based on those surrogate animal studies. In rare cases, accidental and occupational exposures have provided information relating to actual adverse effects on humans. Using these surrogate studies and as presented in Table 1, the USEPA provides the following overview of some metrics to prioritize potential toxic effects.

Table 1. USEPA Categorizations of Chemical Toxicity

Toxicity Study	Category I High Toxicity	Category II Moderate Toxicity	Category III Low Toxicity	Category IV Very Low Toxicity
Acute Oral	Up to and including 50 mg/kg	> 50 thru 500 mg/kg	> 500 thru 5000 mg/kg	> 5000 mg/kg
Acute Dermal	Up to and including 200 mg/kg	> 200 thru 2000 mg/kg	> 2000 thru 5000 mg/kg	> 5000 mg/kg
Acute Inhalation	Up to and including 0.05 mg/liter	> 0.05 thru 0.5 mg/liter	> 0.5 thru 2 mg/liter	> 2 mg/liter
Eye Irritation	Corrosive (Irreversible destruction of ocular tissue) or corneal involvement more than 21 days	Corneal involvement or irritation clearing in 8-21 days	Corneal involvement or irritation clearing in 7 days or less	Minimal effects clearing in less than 24 hours
Skin Irritation	Corrosive (tissue destruction into the dermis and/or scarring)	Severe irritation at 72 hours (severe erythema or edema)	Moderate irritation at72 hour (moderate erythema)	Mild or Slight irritation (no irritation or slight erythema)

Many commercially available pesticide products contain additives (surfactants, etc.) so the specific products listed in this appendix are evaluated in the formulations that would likely be used by the Authority. In some cases, formulations of chemicals contain additives and/or surfactants which will be identified due to potential toxicological concerns of these additives. Although not directly proposed under the IPM Program, an additive that will be identified when necessary is nonylphenol ethoxylates (NP9E), which is used as a surfactant. These chemicals that contain the active ingredient nonylphenol (NP) and its ethoxylates have some regulatory concern (USFS 2003). Currently, there is continuing concern regarding the toxicity of NP9E compounds to aquatic organisms (SERA 1997 and USFS 2003). Of the active ingredients proposed for use, NP9E is commonly used with clopyralid, glyphosate and/or triclopyr formulations.

Potential risk must also include chronic or long-term exposure and potential development of cancer. In many cases, the studies used to evaluate the potential linkages to cancer are based on demographic, epidemiological studies in which the linkage is weak or not statically valid. However, to provide a conservative evaluation of chemicals of concern, these linkages are included in the determination of the cancer classification. Classifications of the chemicals proposed for use under the IPM Program are included in Table 2 below.

Table 2. USEPA Cancer Classifications of Chemicals Evaluated in a Recent USEPA Agency Wide Review

CHEMICAL	CAS NO.*	PRODUCTS	CANCER CLASSIFICATION	USEPA REPORT DATE
Aminopyralid	150114-71-9	Capstone Milestone	Not Likely to be Carcinogenic to Humans.	7/12/2015
Cinnamon Oil Clove Oil	8015-91-6 8000-34-8	Weed Zap	Not Likely to be Carcinogenic to Humans.	5/11/2015
Clethodim	99129-21-2	Envoy	Not Likely to be Carcinogenic to Humans.	9/28/2007
Clopyralid	57754-85-5	Transline	Not Likely to be Carcinogenic to Humans.	5/22/2015
Chlorsulfuron	64902-72-3	Telar	Group E--Evidence of Non- Carcinogenicity for Humans.	7/17/2002
Dithiopyr	97886-45-8	Dimension	Group E--Evidence of Non-Carcinogenicity for Humans.	5/29/1997
Fluroxypyr	81406-37-3	Vista XRT	Not Likely to be Carcinogenic to Humans.	6/26/2003
Glyphosate	1071-83-6	Roundup Roundup Pro	Not Likely to be Carcinogenic to Humans.	12/12/2017
Isoxaben	82558-50-7	Gallery	Suggestive Evidence of Carcinogenic Potential.	10/7/2008
Pelargonic Acid	112-05-0	Scythe	None.	Not Evaluated[1]
Triclopyr	55335-06-3	Capstone	Group D--Not Classifiable as to Human Carcinogen.	5/9/1996

Note:1 Because of its low toxicity, common occurrence in the diet, and known metabolic pathway, pelargonic acid was not evaluated by USEPA for carcinogenicity or chronic toxicity and it is not considered it carcinogenic (USEPA 1992).

Source: USEPA OPP Annual Cancer Report 2018.

Table 3. Potential Human Toxicity of Chemicals Proposed for Use Under the IPM Program

All data reported for estimates of human toxicity are based on extrapolations of laboratory animal studies that include conservative safety factors to assure that adverse effects are not underestimated.

Chemical Name	Potential Toxicity
2,4-D 2,4-dichlorophenoxyacetic acid CAS No 94-75-7	The USEPA has categorized 2,4-D as low toxicity (Category 3) if ingested and for dermal exposure. 2,4-D is categorized as low and very toxicity (Category 3 and 4) for potential inhalation. It is categorized from 1 to 4 for eye irritation depending on the salt. There is little to no toxicity from skin irritation (Category 3 and 4). (USEPA 2005).
Advion Gel Baits **Indoxacarb** (S)-methyl 7-chloro-2,5-dihydro-2-[[(methoxycarbonyl)[4(trifluoromethoxy)phenyl]amino]carbonyl]indeno[1,2-e][1,3,4] oxadiazine-4a(3H)-carboxylate CAS No 173584-44-6	Indoxacarb is an insecticide classified as a Category 2 (moderate toxicity) oral toxicant for humans. It is listed by USEPA as a Category 4 (very low toxicity) for dermal and inhalation toxicity. It is a moderate eye irritant (Category 3). There is no evidence that indoxacarb is carcinogenic or mutagenic (USEPA 2000, 2015).
CAPSTONE **Triclopyr** 3,5,6-trichloro-2 pyridinyl)oxy]acetic acid CAS No 150114-71-9 **Aminopyralid** 2-pyridine carboxylic acid, 4-amino-3,6-dichloropyridine-2-carboxylic acid CAS No 566191-89-7	Capstone is a combination or triclopyr and aminopyralid and is categorized as Category 3 (low toxicity) and has very low toxicity to humans if ingested, but may cause skin irritation, serious eye irritation, and may cause respiratory irritation at high doses and exposures. Prolonged skin contact is unlikely to result in absorption of harmful amounts. No adverse effects are anticipated from single ingestion exposure (USEPA 1998).

Chemical Name	Potential Toxicity
Cholecalciferol **Vitamin D3** Cholecalciferol baits CAS No. 67-97-0	Cholecalciferol is a rodenticide that was developed to be acutely toxic to rodents. All routes of exposure are Category 1 (high toxicity), including oral, dermal, and inhalation. Based on the recommended and typical methods of use, however, actual potential toxicity to humans is low as the characteristics of formulation and mode of delivery are designed to minimize potential uptake of the chemical when used as a rodent bait (Merck Index 2019).
Dimension **Dithiopyr** 3,5-dimethyl 2-(difluoromethyl)-4-isobutyl-6-(trifluoromethyl)pyridine-3,5-dicarbothioate CAS No 97886-45-8	Dithiopyr has low acute toxicity to mammals and humans if ingested. Dithiopyr is not known to have mutagenic or carcinogenic effects. It is a Category 4 (very low toxicity) chemical for humans by all routes of exposure (USEPA 1991, Ward 1993).
Diatomaceous earth **Diatomaceous earth/Silica** CAS No. 91053-39-3	Diatomaceous earth is an insecticide that is categorized as Category 4 (very low toxicity) if ingested and has low inhalation toxicity as Category 3 (low toxicity). Due to its physical characteristics, diatomaceous earth may cause mild eye and skin irritation in some people (USEPA 2003).
ENVOY Plus **Clethodim** 2-[1-[[(3-chloro-2-propenyl)oxy]imino]propyl]-5-[2-(ethylthio)propyl]-3-hydroxy-2-cyclohexen-1-one CAS No. 99129-21-2	Clethodim is classified as Category 3 (low toxicity) for oral and dermal toxicity and skin irritation. Inhalation toxicity is Category 4 (very low toxicity). No treatment related increases in neoplasms were observed in any study. Clethodim is neither neurotoxic nor immunotoxic (Valent MSDS 2003, USEPA 1990a,b).
Gallery **Isoxaben** Benzamide, N-[3-1-ethyl- 1-methy propyl)-5- isoxazole l]-2,6-dimethoxy CAS No :82558-50-7	Oral toxicity of Gallery is very low (Category 4). No adverse effects have been reported for inhalation, but Gallery has the potential for minor skin irritation from dust exposure. There are no reports of eye irritation or contact allergy (IRIS 1988).
Garden Safe Insecticidal Soap Spray CAS No. 947173-77-5	Soap salts such as Garden Safe have low oral and dermal toxicity. At excessive exposures, soap salts may be irritating to the skin and eyes. These products are generally considered safe by the FDA. The USEPA classifies soap salts as Category 4 (very low toxicity) for all acute effects (USEPA 1992).
Gentrol Point Source **Hydroprene** Ethyl(2E,4E.7S)-3,7,11-trimethyl-2,4-dodecadenoate CAS No. 67733-18-8	Hydroprene is an insecticide listed as a Category 4 (very low toxicity) for humans and Category 3 (low toxicity) for dermal and inhalation routes of exposure. There is no evidence for genotoxicity or mutagenicity. (Fed Reg 62, 1997, NPIC 2001).
RoundUp/RoundUp Pro/RoundUpMAX **Glyphosate** **Isopropylamine salt**, potassium salt, dimethylamine salt & diammonium salt CAS No. 38641-94-0 50.2	Decades of research has indicated that glyphosate has low toxicity if ingested. Skin and eye irritation from exposure is possible. There is no evidence of neurotoxicity, immunotoxicity, or acute toxicity. Reproductive toxicity may occur at very high doses. Recent claims of carcinogenicity (class 2A) were based on animal studies. Substantial evidence finds human carcinogenicity unlikely. Some studies suggest that glyphosate may be a possible endocrine-disruptor (USEPA 2017a).
Maxforce Bait Stations **Fipronil** 1H-Pyrazole-3-carbonitrile, 5-amino-1-[2,6-dichloro-4-(trifluoromethyl)phenyl]-4-[(trifluoromethyl)sulfinyl] CAS No. 120068-37-3	Fipronil is an insecticide that exhibits moderate acute toxicity (Category 2) by the oral and inhalation routes. Dermal exposure to fipronil is low (Category 3). It is relatively non-irritating to the skin (Category 4) and eye (Category 3). It is not mutagenic but has been classified as a Group C, possible human carcinogen (USEPA 1996).
Milestone **Aminopyralid** 2-pyridine carboxylic acid, 4-amino-3,6-dichloropyridine-2-carboxylic acid CAS No. 566191-89-7	Aminopyralid has very low oral, dermal and inhalation toxicity (Category 3). No adverse effects are anticipated from single inhalation exposures. It is essentially non-irritating to skin or eyes. Corneal injury is unlikely. It has not shown allergic skin reactions in animals. Aminopyralid did not cause cancer in laboratory animals. There are no reports of birth defects or any other fetal effects. Aminopyralid did not interfere with reproduction or cause in vitro genetic toxicity (mutagenicity) studies (USEPA 2005).
Polaris **Imazapyr** 2-[4,5- dihydro-4-methyl-4-(1- methylethyl)-5-oxo-1H-imidazol- 2-yl]-3-pyridinecarboxylic acid CAS No: 81510-83-0	Imazapyr is practically non-toxic (Category 3 and 4) after ingestion. There are no reports of effects on mammalian reproduction. The chronic estimated level of concern for mammals was not exceeded for any of the registered uses. The chronic risk for mammals is low following all exposure routes to imazapyr. There is no evidence of carcinogenicity, neurotoxicity, or immunotoxicity after exposures to Imazapyr (USEPA 2006).
Scythe **Pelargonic acid** (1-nonanoic acid) CAS No: 112-05-0	The acute toxicity of pelargonic acid to humans is very low, except for moderate, but reversible, eye irritation (Category 2). Oral acute toxicity is very low (Category 4) and dermal and inhalation toxicities are ranked by U.S. EPA as Category 3. Exposure to concentrated solutions of pelargonic acid causes skin and eye irritation. It is a natural component of many foods which suggests that it is not toxic at doses that are likely to occur in the diet.

Chemical Name	Potential Toxicity
Transline **Clopyralid**, (Lontrel) (Cody (Alligare) (Confront) (Thistledown) Monoethanolamine salt 3,6-dichloro-pyridinecarboxylic acid CAS No. 57754-85-5	Clopyralid has very low toxicity (Category 3) if ingested. Clopyralid is classified by the USEPA as "not likely to be a human carcinogen." However, there are some indications of potential birth defects at very high doses. No birth defects were observed in animals given clopyralid at doses several times greater than those expected during normal exposure. Clopyralid is not mutagenic (USDOE 2000, SERA 2004).
TELAR **Clorsulfuron** (2-Chloro-N-[(4-meth oxy-6-methyl-1,3,5-triazin-2- yl)aminocarbonyl] benzenesulfonamide) CAS No. 64902-72-3	Chlorsulfuron has very low toxicity (Category 3) if ingested. There is no evidence of mutagenicity, carcinogenicity, reproductive or developmental (teratological) effects after exposure to clorsulfuron. There is some potential for eye and skin irritant but is not a dermal sensitizer. Very high levels of exposure to clorsulfuron showed effects on embryo-fetal development in animals, but only at levels equal to or above those causing maternal toxicity (USEPA 1994, MSDS Dupont 2014)
Terro Ant Killer II **Boric Acid** Sodium tetraborate decahydrate CAS No. 10043-35-3	Borax is an insecticide listed as low toxicity as a Category 3 compound for oral and dermal toxicity and skin irritation. It is listed as a Category I eye irritant due to its physical characteristics. The USEPA has classified boric acid as a Group E carcinogen, indicating that there is no evidence of carcinogenicity to humans (USEPA, 1993).
Vista XRT **fluroxypyr** 1-methylheptyl ester CAS No. 81406-37-3 Solvent naphtha CAS No. 64742-94-5 N-Methyl-2-pyrrolidone CAS No.872-50-4	Fluroxypyr has very low (Category 3 and 4) acute oral toxicity if ingested. The acute dermal toxicity is very low to none (Category 4). No Acute inhalation toxicity and no respiratory irritation have been reported. It is not likely to be carcinogenic to humans (USEPA 2006, DOW MSDS 2015).
Wasp-Freeze **Pyrethrin/Pyrethroids** (Cyclopropanecarboxylic acid, 2-methyl-4-oxo-3-(2-propynyl) cyclopent-2-enyl-cis, trans-chysnthemate) CAS No. 23031-36-9	Wasp Freeze has very low (Category 3 and 4) toxicity if ingested. However, the oral toxicity varies according to the type of pyrethroid because of the range of products containing the base chemical. Minor effects on the nervous system (Category 3) have been observed. No other significant effects have been reported. Some animal studies suggest that low level exposures may result in reproductive and immunological effects. Some indication that pyrethrins may be of some carcinogenic concern (USEPA 2006, USEPA 2015, ATSDR 2003).
Weed Zap Cinnamon and Clove CAS No. 8015-91-6 CAS No. 8000-34-8	Weed Zap has very low toxicity to humans if ingested. Weed Zap is classified by the USEPA as very low to non- toxic (Category 4). It is not a human carcinogen and not mutagenic. Weed Zap has no documented adverse effects in animal studies. No birth defects were observed in animals given Weed Zap at doses several times greater than those expected during normal exposure (WeedZap 2015).

Note: The toxicity data are derived from controlled laboratory animal studies designed to determine the potential adverse effects of the chemical under several possible routes of exposure. Data are derived from each listed USEPA registration sites (USEPA). The LD50 values are provided for estimate of relative toxicity of the a.i. (WHO 2009). Toxicity to other animals and humans based on specific exposure scenarios may be higher or lower, based on additional physical and exposure conditions.

Many of the pesticides described in this document are pyridine herbicides, which are used to control weeds such as broad leaf weeds around power lines and on lawns, golf courses, parks, and crops. Herbicides in this group include: aminopyralid, clopyralid, fluroxypyr, dithiopyr and triclopyr.

Although this evaluation provides the documented potential hazards of the chemicals proposed for use by Authority staff and technicians, the important concept of risk associated with a chemical is the actual exposure (dose) taken in or contacted by the individual. That concept drives the development of BMPs for each pesticide as described on their label and guidance provided by USEPA and other regulatory agencies. Even the most toxic chemical in the proposed pesticides would not result in adverse effects or unacceptable risk if there is no contact or intake of the product. This principle is used as the primary operational approach used by pesticide applicators during operations and applications.

Hazard Characterization

Herbicides

2,4-D (2,4-Dichlorophenoxyacetic Acid)

Broad-spectrum control of many annual, biennial and perennial broadleaf weeds.
Cut-stump, spray (backpack or boom on ATV), wicking
Enlist Duo
CAS No. 94-75-7
2,4-dichlorophenoxyacetic acid
Amber, white or clear aqueous liquid, salts dissociate easily in water
Moderate chronic toxicity to non-target organisms

Mode of Action

2,4-D is an auxin-based herbicide that kills broadleaf weeds by causing the cells in the tissues that carry water and nutrients to divide and grow rapidly to destroy the integrity of the cells.

Environmental Fate and Transport

2,4-D does not persist in the environment after it's applied and result in potential for exposure in both terrestrial and aquatic environments. It is rapidly broken down by microbial action in the soil and does not persist, accumulate or leach to groundwater under conditions of proper use. Average soil half-life is about five days (2 to 13 days) with a maximum depth of 6 inches after surface applications. The half-life in water is about one to two weeks.

2,4-D is a systemic herbicide with auxin like activity used to control many types of broadleaf vegetation. It is widely used in the U.S. for the control of woody species such as willow, alder, sumac, and sagebrush. In forestry, herbicide formulations containing 2,4-D are commonly used in wildlife openings, rights-of-way maintenance, and noxious weed control (USFS 2006). Many different formulations, including esters, amines, and salts of the primary acid, are prepared for use in the field and sold by several manufacturers. In general, herbicides formulated with 2,4-D esters have higher concentrations of 2,4-D than do herbicides formulated with 2,4-D salts (USFS 2006). Variations in these formulations affect toxicity, mobility, volatility, and persistence to some degree. More than one form is used for rangeland and forests (2-ethylhexyl ester, butoxyethanol ester, dimethylamine salt, and isooctyl ester).

The USEPA (2005) provided a toxicity review (R.E.D.) of 2,4-D, including most of the forms in the numerous products that include it. However, after some concerns were identified about non-target toxicity, and in response to a petition to drop all uses (Federal Register 2012), the USEPA reviewed and reported its conclusions about the newer studies . In 1998 a USFS assessment was completed for 2,4-D and the assessment was updated by the USDA/FS (2011). For 2,4-D, risk estimates developed for exposures suggest that concern should be exercised for workers, members of the general public, and many organisms.

For many pesticides, including 2,4-D, risk estimates based on extremely conservative and likely unrealistic exposures may lead to risk quotients that exceed the actual level of concern. Due to its inherent toxicity, however, 2,4-D exposures that may be plausible increase the basic level of concern beyond the typical level of uncertainty. These exposures, however, consider routes that would be associated with unusually high contact or uptake of the chemical.

Consumption of highly contaminated vegetation may result in unacceptable levels and high HQ values. Similarly, adverse effects in some applications of 2,4-D salts or esters taken up by terrestrial and aquatic plants, mammals, and birds may be of concern. Adverse effects on aquatic animals are not likely with formulations of 2,4-D salts except for accidental and extreme exposures at the upper ranges of application rates. The ester formulations of 2,4-D are more toxic to aquatic animals.

Application scenarios for 2,4-D should consider alternate herbicides where possible and effective alternatives are available. The use of 2,4-D should be limited to situations where other herbicides are ineffective or to situations in which the risks posed by 2,4-D can be mitigated.

Human Toxicology

Based on reviews from regulatory agencies (including extensive reviews conducted by the USEPA and Canada's Pest Management Regulatory Agency (PMRA) as recently as 2005 and 2008, respectively) uses the regulatory guidance and MSDS recommendations. Potential exposure from labelled uses of 2,4-D are thousands of times less than levels that would pose a risk to human health. The results of the majority of expert scientific panel reviews worldwide report that 2,4-D does not present an unacceptable risk to human health or the environment when used properly. 2,4-D has only a low to moderate acute toxicity when exposed to the concentrated material, is not an endocrine disruptor, and has no reported adverse developmental or reproductive effects. There has been no clear indication that is carcinogenic.

The International Agency for Research on Cancer (IARC) had not assigned 2,4-D a cancer rating as of June 2008. However, in 1987, IARC placed the family of chlorophenoxy herbicides in Group 2B, possibly carcinogenic to humans. Although the free acid form of 2,4-D did not damage chromosomes, there is limited evidence that commercial formulations may have the potential to do so. Overall, evidence for mutagenicity has been inconsistent.

Numerous epidemiological studies have examined potential associations between exposure to 2,4-D and respiratory effects, endocrine effects, ocular effects, body weight effects, immunological effects, neurological effects, reproductive effects, developmental effects, various cancers and death. Among the various types of cancers examined (lymphatic system cancers, gastrointestinal cancer, breast cancer, cancers of the nervous system, prostate cancer, and others), lymphatic system cancers, in particular non-Hodgkin's lymphoma (NHL), has received the most attention and has been the subject of several reviews. No significant differences were reported in studies that assessed combinations of 2,4-D and other phenoxy acids such as 2,4,5-T or 2,4-dichlorophenoxypropionic acid (2,4-DP) and 2,4-dichlorophenoxybutyric acid (2,4-DB). Overall, 2,4-D has exhibited low toxicity in studies of humans environmentally or occupationally exposed to this chemical. The USEPA conducted a weight-of-evidence analysis of the potential interaction of 2,4-D with the androgen, estrogen, and thyroid signaling pathways and concluded that there is no convincing evidence of interaction with any of the three pathways. The available data suggest that 2,4-D is not neurotoxic at environmentally relevant doses (in the low µg/kg body weight/day range).

Some reports have linked exposure to 2,4-D and non-Hodgkin's lymphoma (a blood cancer) and sarcoma (a soft-tissue cancer), but no studies have been shown the link to be statistically defensible. In 2015, IARC declared 2,4-D a possible human carcinogen based on reports of cancer in laboratory animals. 2,4-D has been included in USEPA's listing of possible endocrine-disrupting chemicals based on some laboratory tests suggesting that 2,4-D can impede the normal action of estrogen and androgen. 2,4-D has been combined with glyphosate to produce Enlist Duo with specific proportions that is safer than applications of the two separately.

Ecological Toxicology

Exposures of wildlife to 2,4-D, whether through direct contact or consumption of treated vegetation, has been shown to be of low toxicological concern. Studies have shown 2,4-D is practically non-toxic to both freshwater and estuarine/marine fish, amphibians (frogs), only slightly toxic to aquatic invertebrates, and practically non-toxic to honeybees and earthworms. Most studies have been conducted on animals using oral exposures. Oral studies in animals have reported a wide range of effects in acute-, intermediate-, and chronic-duration studies. Acute-duration studies have reported LD50 values ranging from 100 mg/kg in dogs to 1,000 mg/kg in guinea pigs. Dogs appear to be more sensitive than rats and mice. This appears to be due to dogs having a significantly lower capacity to eliminate 2,4-D via the kidneys than other species, including humans. Systemic effects reported in repeated exposure oral studies include hematological alterations in rats (decreased hemoglobin, platelets, and erythrocyte counts); hepatic effects in rats (histological alterations) and dogs (perivascular inflammation); renal effects in rats, mice, and dogs; alterations in thyroid hormone levels in rats; ocular effects in rats; and alterations in body weight gain in most species tested. Studies show that 2,4-D breakdown products are practically non-toxic to honeybees, the potential for 2,4-D and its salts and esters is predicted to pose minimal risk to pollinators and other beneficial insects.

Capstone (aminopyralid and triclopyr)

aminopyralid

Broad spectrum weeds, including invasive broadleaf weeds and sensitive woody plants Nonselective post-emergent broad-spectrum weed control. Plant growth regulator.

Cut-stump, spray (backpack or boom on ATV), wicking

Capstone

CAS No. 57213-69-1

2-pyridine-carboxylic acid, 4-amino-3,6-dichloro

Light yellow to amber liquid, nonflammable, slight odor

Low Human toxicity, eye irritation possible. No evidence of neurotoxicity, carcinogenicity, immunotoxicity or reproductive/developmental toxicity

Practically non-toxic to birds, fish, and aquatic invertebrates and bees

Occurs in water naturally

Mode of Action

Capstone label recommends use on broad spectrum weeds, including invasive broadleaf weeds and sensitive woody plants, while safe to use on most desirable grasses. Capstone is approved for use on rangeland, permanent grass pastures (including grasses grown for hay), forests, Conservation Reserve Program (CRP) acres, non-cropland areas (such as roadsides and utility rights-of-way), non-irrigation ditch banks, seasonally dry wetlands, natural areas, and other sites as described on the label. There are no grazing restrictions for any class of livestock including lactating animals. This amine formulation is essentially non-volatile and USEPA includes a *Caution* signal word. A thorough evaluation of the retail product has not been completed while USEPA has reported the effects of each of the two components.

Environmental Fate and Transport

In aquatic systems, the primary route of degradation is photolysis, with a half-life of 0.6 days (corrected for natural sunlight conditions). Oxamic and malonamic acid and $C0_2$ are breakdown products. Aminopyralid is stable to hydrolysis and in anaerobic sediment-water systems. In aerobic sediment-water systems, it has half-lives of 462 to 990 days. Under aerobic conditions, degradation of aminopyralid in five different soils resulted in the production of no significant degradation products beyond CO_2 with half-lives from 31.5 to 533.2 days. Aminopyralid photolyzes moderately slowly on a soil surface. The half-life was 72 days (corrected for natural sunlight and soil metabolism) and CO_2, non-extractable residues and small amounts of acidic volatiles were the degradation products. Aminopyralid photolyzes moderately slowly on a soil surface with a half-life or 72 days. Aminopyralid is weakly sorbed to soil with 48-hour Kd values of 0.03 to 0.72 mL/g; adsorption Koc values were 1.05 to 24.3 mL/g. The results indicate that aminopyralid is likely to be non-persistent and relatively immobile in the field

Human Toxicology

Acute toxicity data indicate that aminopyralid has low toxicity via oral, dermal and inhalation routes of exposure. The technical aminopyralid product is classified in toxicity category I [DANGER] based on an acute eye irritation study conducted with the free acid. The formulated end-use product (Milestone) has low toxicity and is classified in toxicity category IV [Caution]. In an acute neurotoxicity study in rats with aminopyralid, there were no treatment-related effects on Functional Observation Battery (FOB), motor activity, or neuropathological observations. The systemic No Observed Adverse Effect Level (NOAEL) was 1000 mg/kg based on transient clinical observations of fecal soiling in males and urine soiling in females observed at 2000 mg/kg body weight, the highest dose tested [HDT]. In a chronic neurotoxicity study in rats the NOAEL was equal to or greater than 1,000 mg/kg/day [HDT]. Aminopyralid was negative in all mutagenicity studies, except for an in vitro chromosome aberration assay utilizing rat lymphocytes. In this assay, aminopyralid induced chromosome aberrations without S9 activation, but only at cytotoxic concentrations. The clastogenic response was induced secondary to toxicity. Harmful if swallowed, Causes skin irritation, Causes serious eye irritation, May cause respiratory irritation (USEPA 2005)

Ecological Toxicology

In a mouse chronic feeding study, the NOAEL was 1000 mg/kg/day [HDT] for males and 250 mg/kg/day for females. In the rat chronic feeding study, the NOAEL was 50 mg/kg/day based on cecal enlargement, slight mucosal hyperplasia (males) and slightly decreased body weights at 500 mg/kg/day. Aminopyralid has been classified as "not likely" to be carcinogenic to humans. No increases in any tumors were found in carcinogenicity studies in rats and mice. In a metabolism study in rats, aminopyralid was rapidly absorbed, distributed, and excreted following oral administration. Tissue distribution and bioaccumulation were minimal (USEPA 2005).

Triclopyr

Triclopyr mimics auxin, a plant growth hormone, thus disrupting the normal growth and viability of plants
Cut-stump, spray (backpack or boom on ATV), wicking
3,5,6-trichloro-2-pyridinly)oxy]acetic acid
Capstone
CAS No. 55335-06-3
Light yellow to amber liquid, nonflammable, slight odor
Low Human toxicity, eye irritation possible. No evidence of neurotoxicity, carcinogenicity, immunotoxicity or reproductive/developmental toxicity
Practically non-toxic to birds, fish, and aquatic invertebrates and bees

Mode of Action

Triclopyr is a systemic herbicide. It affects actively growing plants by mimicking a specific type of plant growth hormone, auxin. Plants rapidly take in triclopyr through leaves and roots. As a systemic herbicide, triclopyr is absorbed through plant leaves and roots. It tends to The mechanism is a change to uncontrolled plant growth and plant death. After absorbing the herbicide, plants die slowly (within weeks).

Environmental Fate and Transport

Ester and salt forms of triclopyr rapidly turn into the triclopyr acid form in the environment, soluble in water, but the ester form is less soluble. Triclopyr has a low vapor pressure. Triclopyr in water breaks down faster with light. The half-life of triclopyr in water with light is around 1 day. Without light, it is stable in water with a half-life of 142 days.

Triclopyr breaks down relatively quickly in soils. It is mainly broken down by microbes. The soil half-life ranges from 8 to 46 days. In deeper soils with less oxygen, the half-life is longer. Triclopyr is mobile in soils. However, movement studies show that triclopyr was not measured in soils deeper than 15 to 90 centimeters (about 6 to 35 inches). The half-life in plants can vary widely with the type of plant. Barley and wheat plants broke down 85% of triclopyr within 3 days of application. The half-life in grass was between 5 and 20 days. The

Human Toxicology

Triclopyr acid was found to be slightly toxic by oral and dermal routes and has been placed in Toxicity Category III for these effects. Acceptable studies for acute inhalation, primary eye irritation, primary dermal irritation and dermal sensitization were not available for the technical grade of triclopyr acid. Available data indicate that both

BEE and TEA are slightly toxic by oral (Toxicity Category III) and dermal (Toxicity Category III) routes of exposure, and practically non-toxic by inhalation (Toxicity Category IV) and do not cause dermal irritation. In a primary eye irritation study triclopyr TEA was found to be corrosive while BEE was found to be minimally irritating. Both TEA and BEE were found to cause dermal sensitization in test animals. The Agency has classified triclopyr as a Group D chemical (not classifiable as to human carcinogenicity). This decision was based on increases in mammary tumors in both the female rat and mouse, and adrenal pheochromocytomas in the male rat, which were considered to be only a marginal response, and the absence of additional support from structural analogs or genotoxicity.

Technical triclopyr acid was found to be slightly toxic by oral and dermal routes (Toxicity Category III). Acute effects include inhalation, primary eye irritation, primary dermal irritation and dermal sensitization while both BEE and TEA are slightly toxic by oral (Toxicity Category III) and dermal (Toxicity Category III) routes of exposure, and practically non-toxic by inhalation (Toxicity Category IV). They do not cause dermal irritation. These chemicals are classified a Group D chemical (not classifiable as to human carcinogenicity).

Ecological Toxicology

Triclopyr is practically non-toxic to slightly toxic to birds. Long-term exposures to birds (acid form) may affect eggshell thickness. While the salt form is practically non-toxic to slightly toxic to shellfish, the ester form is moderately to highly toxic. All forms of triclopyr can be toxic to algae.

For fish, the acid and salt forms are practically non-toxic, but the ester form is moderately to highly toxic. The ester form can bioaccumulate (build up) in fish. However, the ester form rapidly degrades to the acid form in the environment and fish are not likely to contact large amounts of the pesticide. A breakdown product of triclopyr is TCP which is slightly to moderately toxic to fish and shellfish. Triclopyr is practically non-toxic to bees.

Table 4. Toxicity of Two Forms of Triclopyr Chemicals

Triclopyr, butoxyethyl ester (BEE)	2170	55335-06-3	> 5,000	Very Low	2004
Triclopyr, triethylamine salt (TEA)	2131	57213-69-1	> 5,000	Very Low	2011

From: Triclopyr Fact Sheet, USEPA 2011.

Dimension (dithiopyr)

Pre-emergent for control of crabgrass turf and ornamental grasses and broadleaf weeds

Cut-stump, spray (backpack or boom on ATV), wicking

Dimension

CAS No 97886-45-8

Dimethyl 2-(difluoromethyl)-4-(2-methylpropyl)-6-(trifluoromethyl)pyridine-3,5-dicarbothioate

Solid, white to burnt yellow color

No evidence of mutagenic or developmental impacts, Nontoxic to birds, low toxicity to rats

Little or no potential for water contamination, low degradation in soils

Mode of Action

Dithiopyr acts as a root growth inhibitor, causing cessation of root elongation and inhibition of mitotic cell division. It inhibits formation of microtubules and spindle organizing centers. Dithiopyr may alter microtubule polymerization and stability by "interacting with microtubule associated proteins or microtubule organizing centers rather than interaction directly with tubulin." Mitotic cells are arrested in late prometaphase. Cell entry into mitosis is unaffected. Dithiopyr is a preemergent herbicide for crabgrass control in turf and ornamental grasses, grassy and broadleaf weeds.[1] Dithiopyr inhibits root growth of susceptible weeds as well as turf grass and thus should be used only on established turf with a well-developed root system. Its duration of efficacy is approximately 4 months, so lawns should not be reseeded during this time frame following application of the chemical. Dithiopyr acts primarily as a preemergent herbicide but can also be used in early post-emergent control of crabgrass.

Environmental Fate and Transport

Dithiopyr degrades slowly in water. Hydrolysis is not a significant route of degradation. Dithiopyr is slightly mobile to relatively immobile in soil. Photodegradation is not a significant route of degradation in soil. Volatilization contributed more to dissipation than soil aerobic metabolism. Field dissipation for turf grass had a half-life of 17-61 days (USEPA 1991).

Human Toxicity

Dithiopyr has low acute toxicity to mammals. The oral LD50 and 24-hr dermal LD50 for rats is >5,000 mg/kg. The 4-hr inhalation LC50 for rats is 5.98 mg/L. The NOELs for systemic and reproductive toxicity in rats are 25 and 2,500 mg/L, respectively (Ward 1993). Dithiopyr is not known to have mutagenic or carcinogenic effects. Technical triclopyr acid was found to be slightly toxic by oral and dermal routes and has been placed in Toxicity Category III for these effects. Studies for acute inhalation, primary eye irritation, primary dermal irritation and dermal sensitization were not available for the technical grade of triclopyr acid. Available data indicate that both BEE and TEA are slightly toxic by oral (Toxicity Category III) and dermal (Toxicity Category III) routes of exposure, and practically non-toxic by inhalation (Toxicity Category IV) and do not cause dermal irritation. In a primary eye irritation study triclopyr TEA was found to be corrosive while BEE was found to be minimally irritating. Both TEA and BEE were found to cause dermal sensitization in test animals. The Agency has classified triclopyr as a Group D chemical (not classifiable as to human carcinogenicity). This decision was based on increases in mammary tumors in both the female rat and mouse, and adrenal pheochromocytomas in the male rat, which were considered to be only a marginal response, and the absence of additional support from structural analogs or genotoxicity.

Ecological Toxicology

Little recent information has been submitted for the potential ecological effects of dithiopyr. However, MacBean (2012), reports the following data: LD50 for bobwhite quail is greater than 2250 mg/kg, the 5-day LC50 for bobwhite quail and mallard is greater than 5620 mg/kg, the 96-hr LC50 for bluegill and carp is 0.7mg/L, the 96-hr LC50 for trout is 0.5 mg/L, the 48-hr EC50 for Daphnia is 1100 µg/L, the 14-day LC50 for worms is greater than 1000 mg/kg, and the contact LD50 for bees is 80 µg/bee.

It is of low acute toxicity to mammals and has not been associated with carcinogenic or mutagenic effects. Little is known about the environmental impacts of dithiopyr use. However, based on proper use and BMP application practices, proper application of dithiopyr should not result in unwanted adverse effects.

Envoy (clethodim)

Selective control of postemergence herbicide for control of annual/perennial grasses.
Cut-stump, spray (backpack or boom on ATV), wicking
CLETHODIM 2, EC Envoy Plus
CAS No 99129-21-2
(E)-2-[1-[[(3-chloro-2-propenyl)oxy]imino]propyl]-5-[2-(ethylthio)propyl]-3-hydroxy-2-cyclohexen-1-one

Mode of Action

CLETHODIM 2 EC herbicide is a selective postemergence herbicide for control of annual and perennial grasses. Clethodim is the active ingredient in Envoy Plus and is highly selective for post-emergent grass control. It is not toxic to broadleaf or pre-emergent plants, and it is therefore highly effective in controlling invasive grasses that grow within broadleaf habitats and in eradicating annual unwanted grasses from perennial grasslands. It is used in early to mid-season spot and broadcast applications at a high rate of 32 oz/acre on perennial grasses and a low rate of 16 oz/acre on annual grasses.

Environmental Fate and Transport

Clethodim is relatively nonvolatile. In soil, it is non-persistent, mobile, and weakly binds to soil particles. It is broken down in soil through primarily aerobic processes (t ½ = 1-2.6 days). Its degradation under anaerobic conditions is slow in both water (t ½ = 128 days) and sediment (t ½ = 214 days). Clethodim is not soluble in water. Because it is has a very short half-life in soil (1-3 days), it is unlikely to leach into and contaminate ground water sources (USEPA 1990a, 1990b)).

Human Toxicology

Clethodim is listed as Category IV for oral, dermal, and inhalation toxicity. The mammalian oral and dermal LD50s are both >5,000 mg/kg, and the acute inhalation LC50 is >3.9 mg/L. It is a Category III eye irritant and skin irritant and is a dermal sensitizer). Chronic toxicity has been shown to increase liver weights and anemia in rats. There is no evidence of reproductive toxicity or carcinogenicity for pure clethodim. However, Envoy contains small amounts of naphthalene, which is listed as a Group 2B (possibly carcinogenic) compound by the USEPA and a carcinogen under California Proposition 65 (Valent, 2006).

Increased liver weights and anemia have been observed in animals exposed to Clethodim Technical. Clethodim Technical was not carcinogenic to animals.

Prolonged or repeated dermal exposures may cause drying, scaling and even blistering of the skin. Reports have associated repeated and prolonged occupational overexposure to solvents with permanent brain and nervous system damage. Symptoms include fatigue, concentration difficulties, anxiety, depression, rapid mood swings and short-term memory loss. This product contains naphthalene which has been listed by the International Agency for Research on Cancer (IARC) as possibly carcinogenic to humans (Group 2B). Clethodim Technical produced developmental toxicity only at maternally toxic dose levels. It is not expected to present a hazard under normal use conditions. There is limited evidence of fetal and maternal toxicity from exposure to naphthalene, a constituent of ENVOY. No reproductive toxicity was observed in animals exposed to the active ingredient clethodim in ENVOY.

Clethodim is readily absorbed in the gastrointestinal tract, with approximately 90% absorption of oral doses. It is rapidly metabolized and eliminated (primarily sulfoxide metabolites, about 63%) with less than 1% recoverable unchanged (USEPA 1990a).

Ecological Toxicology

No effects on fertility, length of gestation or growth and development of offspring were observed at doses up to and including the highest dose tested, 263 mg/kg/day. Reductions in fetal body weights and increases in skeletal abnormalities were observed in rats at doses of 350 mg/kg/day and higher. In another study of rats, there were significant reductions in fetal body weight, litter size and significant increases in cervical rib deformation at doses of 700 mg/kg/day, but not at lower doses. The evidence suggests that while there have been documented teratological effects in animal studies, such effects are unlikely in humans under normal conditions of exposure. Clethodim did not show mutagenic potential.

Clethodim is slightly toxic to fish and aquatic invertebrate species. Reported 96-hour LC50s ranged from 18 mg/L to 56 mg/L in rainbow trout, and 33 mg/L in bluegill sunfish. A 48-hour LC50 of 20.2 mg/L has been reported for Daphnia species. No effects were seen at concentrations of 5.5 mg/L in Daphnia. No significant bioaccumulation has been observed in fish. Under likely conditions of use, it is unlikely to pose a hazard to aquatic species.

Clethodim is practically non-toxic to honeybees with reported LD50s of greater than 100 ug/bee for both the technical product and Select formulation. USEPA has stated that "available...wildlife data indicate that the proposed uses on cotton and soybeans will result in minimal hazard to nontarget and endangered beneficial insect, avian and freshwater fish and mammalian species". Clethodim is selectively toxic to plants, affecting only grass species.

Gallery (isoxaben)

Turf grasses, broadleaf weeds, grasses, vines, and around ornamental shrubs and trees.
Cut-stump, spray (backpack or boom on ATV), wicking
Gallery 75 DF Specialty Herbicide, Snapshot 2.5 TG
CAS No 82558-50-7
Isoxaben (N-[3-(1-ethyl-1-methylpropyl)-5-isoxazolyl] -2,6-dimethoxybenzamide and isomers)
White, odorless, occurs as a suspension
Very low toxicity to humans, non-irritating to eyes or skin. Slight increase in liver tumors possible birth defects in rabbits, no evidence of mutagenicity, or reproductive toxicity.
Very acutely toxic to fish, aquatic invertebrates

Mode of Action

Isoxaben disrupts the enzymes needed for protein synthesis, preventing growth of unwanted weeds. isoxaben is a selective preemergent herbicide used primarily to control several broadleaf weeds and grasses in non-cropland areas. It has pre-emergent efficacy so that it will not control established weeds and must be applied before the unwanted weeds have emerged, during germination. Isoxaben is EPA registered for use on turf grasses, broadleaf weeds, grasses, vines, and around ornamental shrubs and trees.

Environmental Fate and Transport

Bioconcentration potential is low (BCF < 100 or Log Pow < 3). Isoxaben biodegrades very slowly in the environment, but it the biodegradation rate may increase in soil and/or water with acclimation (Federal Register 2018).

Human Toxicity

Isoxaben is a classified category III chemical for low toxicity. Products containing isoxaben carry the signal word CAUTION which is associated with low but possible hazard. Isoxaben is classified as a non-carcinogen, very low toxicity if swallowed (IRIS 1989). Harmful effects not anticipated from swallowing small amounts. Acute dermal toxicity Prolonged skin contact is unlikely to result in absorption of harmful amounts. The rat LD50 is > 5,000 mg/kg . No adverse acute effects are anticipated from inhalation, no respiratory irritation. The Rat inhalation LC50 is > 5.71 mg/l. Brief contact is essentially nonirritating to skin. Essentially nonirritating to eyes. No evidence of mutagenicity, teratogenicity, or reproductive toxicology.

Ecological Toxicity

Very highly toxic to aquatic organisms on an acute basis (LC50/EC50 <0.1 mg/L in the most sensitive species). LC50, Oncorhynchus mykiss (rainbow trout), flow-through test, 96 Hour, > 200 mg/l. Acute toxicity to aquatic invertebrates EC50, Daphnia magna (Water flea), static test, 48 Hour, 544 mg/l, acute toxicity to algae/aquatic plants (green algae),chronic aquatic toxicity chronic toxicity to fish, chronic toxicity to aquatic invertebrates.

Milestone (aminopyralid)

Post emergent broadleaf weeds and woody plants, including knapweeds, hawkweeds, rush skeleton weed, and thistles
Cut-stump, spray (backpack or boom on ATV), wicking
Milestone
2-pyridine carboxylic acid, 4-amino-3,6-dichloro
CAS No. 150114-71-92
Brown liquid, mild odor, thermally stable,
Very low toxicity to rats, low dermal toxicity, no evidence of carcinogenicity, mutagenicity, teratogenicity, or reproductive toxicity
Practically nontoxic to fish, aquatic invertebrates, birds, terrestrial vertebrates

Mode of Action

Milestone is effective on post emergent broadleaf weeds and woody plants, including knapweeds, hawkweeds, rush skeleton weed, and thistles. Uses include control or suppression of some invasive winter annual grasses such as medusa head. It has been registered under EPA’ s Reduced Risk Initiative. Milestone is approved for use on rangeland, permanent grass pastures, Conservation Reserve Program (CRP) acres, non-cropland areas (such as roadside and utility rights-of-way), non-irrigation ditch banks, seasonally dry wetlands, and natural areas. This product is especially useful as there are no grazing restrictions for any class of livestock including lactating animals.

Environmental Fate and Transport

In aquatic systems, the primary route of degradation is photolysis, with a half-life of 0.6 days. Oxamic and malonamic acid are breakdown products. Aminopyralid was stable to direct hydrolysis and in anaerobic sediment-water systems. In aerobic sediment-water systems, degradation proceeds slowly, with estimated half-lives of 462 to 990 days. Under aerobic conditions, degradation of aminopyralid ranged from 31.5 to 533.2 days. Aminopyralid photolyzes moderately slowly on soil. Aminopyralid is weakly sorbed to soil (SERA 2007).

Human Toxicology

Aminopyralid has low toxicity via oral, dermal and inhalation routes of exposure. The technical aminopyralid product is classified in toxicity category I [DANGER] based on an acute eye irritation study conducted with the free acid. The formulated end-use product (Milestone) has low toxicity and is classified in toxicity category IV [Caution. Aminopyralid was negative in all mutagenicity studies, except for an in vitro chromosome aberration assay utilizing rat lymphocytes. In a rat developmental study, the NOAEL for maternal and developmental toxicity was equal to or greater than 1,000 mg/kg/day. The developmental toxicity studies and the 2-generation reproduction studies have not exhibited quantitative or qualitative susceptibility. There were no systemic toxic effects observed at 1000 mg/kg/day. In a 90-day toxicity study in dogs the NOAEL was 282 mg/kg/day for males and 232 mg/kg/day for females based on slight diffuse hyperplasia and hypertrophy of the mucosal epithelium of the stomach at 1070 mg/kg/day in males and 929 mg/kg/day in females (USEPA 2005).

In the 1-year chronic toxicity study in dogs, the NOAEL was 99 mg/kg/day for males and 93 mg/kg/day for females based on thickening of the stomach, slight lymphoid hyperplasia of the gastric mucosa. In a 90-day mouse dietary study, no toxicity was observed at 1000 mg/kg/day. In a mouse chronic feeding study, the NOAEL was 1000 mg/kg/day for males and 250 mg/kg/day for females. Aminopyralid has been classified as "not likely" to be carcinogenic to humans. No increases in any tumors were found in carcinogenicity studies in rats and mice. In a metabolism study in rats, aminopyralid was rapidly absorbed, distributed, and excreted following oral administration.(USEPA 2005).

Ecological Toxicology

Aminopyralid is practically non-toxic to aquatic organisms on an acute basis . Rainbow trout LC50 static test, 96 Hour, 360 mg/l. *Cyprinodon variegatus* (sheepshead minnow), static test, 96 Hour, > 100 mg/l Acute toxicity to aquatic invertebrates EC50, Daphnia magna (Water flea), static test, 48 Hour, > 460 mg/l LC50, saltwater mysid *Mysidopsis bahia*, static test, 96 Hour, > 104 mg/l . Milestone is practically non-toxic to birds on an acute basis (LD50 > 2000 mg/kg), and dietary basis (LC50 > 5000 ppm). dietary LC50, Colinus virginianus (Bobwhite quail), > 2142mg/kg diet. Oral LD50, Colinus virginianus (Bobwhite quail), > 10,000 ppm. Oral LD50 for bees (*Apis mellifera*) > 460micrograms/bee Contact LD50 for bees > 460micrograms/bee. Very low toxicity to soil-dwelling organisms LC50, *Eisenia fetida* (earthworms), 14 d, survival, > 10,000 mg/kg.

Polaris (Imazapyr)

Nonselective pre-and post-emergent broad-spectrum weed control
Spray application (backpack or boom on ATV) Problem vegetation near roads, trails, parking lots, utilities
Polaris (Nufarm), Stalker (BASF) Arsenal®, Habitat®, Chopper®,
CAS No: 81510-83-0
2-[4,5- dihydro-4-methyl-4-(1- methylethyl)-5-oxo-1H-imidazol- 2-yl]-3-pyridinecarboxylic acid
Imazapyr is of relatively low toxicity to mammals and shows no mutagenic or teratogenic potential. It can be an eye and skin irritant, but is not a dermal sensitizer
Practically nontoxic to fish, aquatic invertebrates, birds, terrestrial vertebrates

Mode of Action

Imazapyr is a non-selective herbicide used for the control of a broad range of weeds including terrestrial annual and perennial grasses and broadleaved herbs, woody species, and riparian and emergent aquatic species. It controls plant growth by preventing the synthesis of branched-chain amino acids. Imazapyr is absorbed quickly through plant tissue and can be taken up by roots. It is translocated in the xylem and phloem to the meristematic tissues, where it inhibits the enzyme acetohydroxy acid synthase (AHAS), also known as acetolactate synthase (ALS). ALS catalyzes the production of three branched-chain aliphatic amino acids, valine, leucine, and isoleucine, required for protein synthesis and cell growth. Environmental pH determines its chemical structure, which in turn determines its environmental persistence and mobility. Below pH 5 the adsorption capacity of imazapyr increases and limits its movement in soil. Above pH 5, greater concentrations of imazapyr become negatively charged, fail to bind tightly with soils, and remain available (for plant uptake and/or microbial breakdown). In soils imazapyr is degraded primarily by microbial metabolism. It is not, however, degraded significantly by photolysis or other chemical reactions.

Environmental Fate and Transport

Imazapyr is slowly degraded by microbial metabolism and can be relatively persistent in soils. It has an average half-life in soils that range from one to five months. At pH above 5, it does not bind strongly with soil particles and can remain available (for plant uptake) in the environment. In water, imazapyr can be rapidly degraded by photolysis with a half-life averaging two days (USEPA 2005). There have been a few reports from the field of unintended damage to desirable, native plants when imazapyr has either exuded out of the roots of treated plants into the surrounding soil, or when intertwined roots transfer the herbicide to non -target plants (Vizantinopoulos and Lolos 1994). In a laboratory study, the half-life of imazapyr ranged from 69-155 days, but factors affecting degradation rates were difficult to identify because the pH varied with temperature and organic content.

Human Toxicology

Using mammals as surrogates for human toxicology studies indicates that Imazapyr is of relatively low toxicity to mammals and shows no mutagenic or teratogenic potential. It can be an eye and skin irritant but is not a dermal sensitizer (American Cyanamid 1986; Cyanamid Ltd. 1997). Imazapyr acid is categorized as practically non-toxic to small mammals. No mortality or clinical signs of toxicity were observed in acute oral studies. The acute risk to mammals following either broadcast granular application or spray application is expected to be low because the highest dose-based EECs are 0.03 (broadcast spray) to 0.1 (granular application) of the highest concentration tested in the acute study which produced no mortalities and no clinical signs of toxicity.

Chronic studies indicated no evidence of adverse reproductive effects. The chronic LOC for mammals was not exceeded for any of the studies registered with USEPA. The chronic risk for mammals is expected to be low following exposure to imazapyr.

Ecological Toxicology

There are no reported chronic risks of imazapyr to fish and invertebrates; however, there are no toxicity data available on the prolonged effects of imazapyr to estuarine/marine fish and invertebrates. Fish and invertebrates inhabiting surface waters adjacent to an imazapyr treated field would not be at risk for adverse acute and/ chronic effects on reproduction, growth and survival when exposed to imazapyr directly or in residues in surface runoff and spray drift as a result of ground and/or aerial spray application. Risk to benthic organisms is also not likely based on the available toxicity data and that imazapyr is not expected to accumulate in benthic systems. Very Low toxicity to rats (Oral LD50 for rats:>5,000 mg/kg), Moderate toxicity for rabbits, dermal LD50 >2,000 mg/kg) and low toxicity to fish, LC50 for bluegill sunfish:>100 mg/LC.

Imazapyr is of relatively low toxicity to birds and mammals. The LD50 for rats is > 5,000 mg/kg, and for bobwhite quail and mallard ducks is >2,150 mg/kg. American Cyanamid reports that studies with rats indicate that imazapyr was excreted rapidly in the urine and feces with no residues accumulating in the liver, kidney, muscle, fat, or blood (Tu, et al.2004).

Imazapyr has not been found to cause mutations or birth defects in animals and is classified by the USEPA as a Group E compound, indicating that imazapyr shows no evidence of carcinogenicity. The LC50s for rainbow trout, bluegill sunfish, channel catfish, and the water flea (Daphnia magna) are all >100 mg/L. Imazapyr (tradename Habitat®) is registered for use in aquatic areas, including brackish and coastal waters, to control emerged, floating, and riparian/wetland species. A recent study from a tidal estuary in Washington showed that imazapyr, even when supplied at concentrations up to 1600 mg/L, did not affect the osmoregulatory capacity of Chinook salmon smolts. Washington State Department of Agriculture (2003) reported that the 96-hour LC50 for rainbow trout fry to be 77,716 mg/L (ppm). Limited information was found on the effects of imazapyr on other non-target organisms such as soil bacteria and fungi. The manufacturers report that Arsenal® is non-mutagenic to bacteria (American Cyanamid, 1986).

Roundup Pro (glyphosate)

Nonselective post-emergent broad-spectrum weed control
Spray application (backpack or boom on ATV
Roundup Pro
CAS No 38641-94-0 50.2
Isopropylamine salt of N-(phosphonomethyl)glycine Isopropylamine salt of glyphosate
Amber-brown, liquid with slight odor. Stable
Glyphosate is of relatively low toxicity to mammals and shows no mutagenic or teratogenic potential. Possible link to some cancers. It can be an eye and skin irritant, but is not a dermal sensitizer

Mode of Action

Glyphosate [N-(phosphonomethyl)glycine] is a nonselective, post-emergent, and systemic herbicide registered for use in agricultural and nonagricultural areas. It is the active ingredient in Aquamaster and Roundup ProMax and is applied to a variety of feed and food crops and agricultural drainage, sewage, and irrigation systems. There are several formulations of glyphosate, including an acid, monoammonium salt, diammonium salt, isopropylamine salt, potassium salt, sodium salt, and trimethylsulfonium or trimesium salt. Glyphosate is not effective on submerged or mostly submerged foliage and therefore is only applied to control emergent foliage (Schuette, 1998; Siemering, 2005).

Environmental Fate and Transport

Glyphosate-isopropylammonium. Active ingredient Isopropylamine salt of N-(phosphonomethyl)glycine; {Isopropylamine salt of glyphosate} with the additive ethoxylated tallowamine 61791-26-2 13. Identity of other components (37%) is withheld due to trade secret information of Monsanto Company. Roundup products all contain the a.i. glyphosate, but in some formulations, additives are used to enhance the efficacy and usefulness of the applications. A Registration Evaluation Decision (R.E.D). was completed for glyphosate by the USEPA (1993), though toxicity and tolerances have been re-evaluated several times as a result of additional chemical uses, as well as new glyphosate salts being registered (e.g. FR 2007, 2011; USEPA 2006, 2006b). Glyphosate is poorly biotransformed in rats and is excreted via feces and urine; neither the parent compound nor its major breakdown product bioaccumulates in animal tissue (Williams et al. 2000).

Human Toxicology

Glyphosate has been studied for decades and mammalian toxicological data has illustrated the lack of mammalian toxicity Rat, Oral LD50: > 5,000 mg/kg which is practically non-toxic. Acute dermal toxicity for the Rat: LD50: > 5,000 mg/kg practically non-toxic. Skin irritation Rabbit, Eye irritation Rabbit, moderate irritation. Acute inhalation toxicity Rat, LC50 practically non-toxic. No skin sensitization for glyphosate acid. Not genotoxic. Not carcinogenic in rats or mice. Developmental effects and reproductive effects in rats and rabbits reported only after extreme doses. Current data continue to indicate that glyphosate is nontoxic to humans, and no endocrine disruption is evident. Glyphosate products are effective, widely used, generally low risk products for weed control (Gertsberg 2011). Some ancillary reports in the press of sublethal effects on disease resistance, biological diversity, or enzyme activity as a result of ingestion/uptake of glyphosate are interesting but without clear mechanisms that can be related directly to glyphosate (Gertsberg 2011).

The USEPA has classified glyphosate as Category III for oral and dermal toxicity (USEPA 1993), and the isopropylamine and ammonium salts of glyphosate that are used as active ingredients in registered herbicide products exhibit low toxicity to mammals via the oral and dermal routes. Although no scientific evidence had unequivocally indicated that glyphosate is carcinogenic or mutagenic (USEPA 1993), a recent report by the WHO (WHO, 2015) suggests that it “may probably be carcinogenic” although the WHO researchers fail to report a statistically significant finding. Use of the term “probably” generally indicates the linkage is not statistically defensible. The WHO report is a summary of discussions by a panel review convened specifically to update information on several chemicals, including the herbicides tetrachlorvinphos, parathion, malathion, diazinon, and glyphosate, in order to evaluate and update the existing information about the potential for adverse effects.

Ecological Toxicity

Aquatic toxicity, fish Rainbow trout (Oncorhynchus mykiss): Acute toxicity, 96 hours, static, LC50: 5.4 mg/L Moderately toxic. Bluegill sunfish (*Lepomis macrochirus*): Acute toxicity, 96 hours, static, LC50: 7.3 mg/L Moderately toxic. Aquatic toxicity, invertebrates Water flea (Daphnia magna): Acute toxicity, 48 hours, static, EC50: 11 mg/L Slightly toxic. Mallard duck (Anas platyrhynchos): Dietary toxicity, 5 days, LC50: > 5,620 mg/kg diet, practically non-toxic. Bobwhite quail (*Colinus virginianus*): Dietary toxicity, 5 days, LC50: > 5,620 mg/kg diet, practically non-toxic. Honeybee (Apis mellifera): Oral/contact, 48 hours, LD50: > 100 µg/bee practically non-toxic. Earthworm (*Eisenia foetida*): Acute toxicity, 14 days, LC50: > 1,250 mg/kg soil practically non-toxic. Bioaccumulation Bluegill sunfish (*Lepomis macrochirus*): Whole fish: BCF: < 1 No significant bioaccumulation is expected.

Special Issues Concerning Glyphosate/Roundup

Regardless of the decades of research indicating that glyphosate is relatively safe when used as designated by USEPA and other regulators, a recent, relevant issue has surfaced for glyphosate, the active ingredient in Roundup. Recent publications regarding a possible linkage of extreme exposure to Roundup to onset of Non-Hodgkin’s lymphoma. However, the preponderance of information and dozens of other studies refute that linkage. In response to this concern, registration of the glyphosate diammonium salt has been cancelled for two manufacturers (Nu Fam and Syngenta) by the USEPA but others remain registered for use.

Of all the products proposed for use by the Authority, the one likely to receive the most scrutiny and public concern is glyphosate (specifically as RoundUp) in its many commercial products. Several dozen reports have been reviewed for Roundup and glyphosate due in part to the public concern about the 2015 World Heather Organization (WHO) designation as a Probable Carcinogen and the highly publicized court cases implicating Roundup exposure to the onset of Non-Hodgkins’ Lymphoma (NHL). Because of the possibility that public concern about the use of Roundup by the Authority could result in claims by individuals that their reported exposure caused cancer, based on the 2015 designation of “Probable Carcinogen” by the IARC, these products have received an extensive discussion here of the conditions and sequence of investigations on the hazard of exposure to Roundup.

Although the role of glyphosate and its hypothetical link to cancer has been the focus of numerous reports in the media and public forums, no clear, unambiguous connection exists between glyphosate exposure and cancer. Despite the apparent lack of toxicity to mammals, concerns have been raised by some groups about the possibility that glyphosate may have long-term cancer effects.

In response to the claims that RoundUp and specifically glyphosate "may be responsible for a substantial role in the onset of cancer". the EPA announced in 2017 that it will not approve labels on products containing glyphosate that link the chemical to cancer. The move was directed at California. In 2017, the state declared the chemical, which is the main active ingredient in the weed killer Roundup, a carcinogen. Roundup producer Monsanto challenged the ruling in federal court, and a judge has temporarily blocked the state from requiring the labels as the lawsuit continues. The revised guidance from EPA to companies registered to sell products containing glyphosate stipulates that California's labels would "constitute a false and misleading statement" and that the agency will no longer approve labels that contain the state's warning. "We will not allow California's flawed program to dictate federal policy," EPA Administrator Andrew Wheeler said in a statement supporting the revised regulatory rule. EPA said the move was based on its numerous internal and contracted studies that show that glyphosate does not pose a public risk when used as directed.

Regardless of the USEPA stance on the lack of correlation between approved uses and NHL cancer, there have been claims of causal connection of glyphosate exposure and this form of cancer. One such claim is the basis of a lawsuit (DeWayne Johnson v. Monsanto Company, et al, 2016,) against Monsanto, the primary producer of glyphosate. During the trial, the plaintiff indicated that due to an accident during mixing he was "drenched" with concentrated Roundup. The lawsuit contends that an individual contracted this form of cancer after his continued exposure to glyphosate products, as the person responsible for weed control in his workplace. During the trial, he indicated that he was inadvertently drenched with Roundup/Ranger Pro after an equipment malfunction and was exposed to windblown sprays, a possible misuse of the product based on label guidance. It can be argued that the information in the reports cited and exposures were not sufficient to establish that the individual's cancer was caused by glyphosate. The correlations presented by the prosecutors do not clearly provide causality.

A universal premise in science is "correlation is not causation." "Weak correlations between the sporadic exposure to glyphosate and onset of NHL are insufficient to assign a finding of reasonable certainty of the source of the cancer." (National Association of Wheat Growers et al. v. Lauren Zeise (Director, California Office of Environmental Health Hazard Assessment [OEHHA] and Xavier Becerra [California State Attorney General]).

The juries in the RoundUp cases have awarded several million dollars to the plaintiffs based on little actual demographically supported exposures to the product based primarily on studies reported to support the claims of diseases linked to glyphosate exposure. Results that challenge the claims of a disease linkage to glyphosate exposure (Williams et al. 2016) suggest that the claims are not supported by the actual exposure and carcinogenicity data. Of the numerous studies that counter the claim of linkages to diseases, especially cancer, one example using a large multi-state and region evaluation of farm workers and others, is provided by Koutros et al. (2017). Glyphosate was not statistically significantly associated with cancer at any site, and in this large, prospective cohort study, no association was apparent between glyphosate and any solid tumors or lymphoid malignancies overall, including NHL and its subtypes".

In another issue, the data on the links between glyphosate and myeloma do not adequately define a potential relationship between glyphosate exposure and multiple myeloma. As a result, following their compiled results of the review of the evidence, the panels concluded that "the data do not support IARC's conclusion that glyphosate is a "probable human carcinogen" and, consistent with previous regulatory assessments, further concluded that glyphosate is unlikely to pose a carcinogenic risk to humans." Numerous other independent researchers have challenged the validity of the WHO assessment on the carcinogenicity of glyphosate (Blair 2017, as detailed in a recent synthesis report (Kelland 2017)). Blair, a former panel member, has testified Roundup Products Liability Litigation (MDL no. 2741, Case no. 16-md-02741-VC) that several published reports rebutting the assessment of the WHO panel were purposely not included by the WHO panel report. Note that the classification for glyphosate is 2A (Probably carcinogenic) by the International Agency for Research on Cancer (IARC) in contrast to the long-held classification of D (not carcinogenic) by USEPA after decades of studies and evaluations. The disparity of results and studies on the carcinogenicity of glycogen is illustrated in the latest Agency for Toxic Substances and Disease Registry (ATSDR) Toxicity Profile for glyphosate in which the recognized classifications vary from D to A.

Recently, in contrast to the claims of potential carcinogenicity, the USEPA renewed the temporary approval of a glyphosate and 2-4-D combination product (Enlist-Duo) for use with weed vectors, indicating it has not received significant adverse data to negate the decision (USEPA 2016). In fact, only very high exposures of laboratory animals to those chemicals suggested as endocrine disruptors can be shown to suggest any link to effects on the endocrine system. Extensive testing indicated that the phenomenon of ED is associated with numerous confounding factors. Based on the large number of chemicals that appeared to exhibit ED effects, EPA recommended numerous test guidelines to evaluate ED of hundreds of chemicals. This effort produced the focused list of 52 chemicals requiring additional scientific testing. This group became the “List 1” chemicals for additional screening. When directed screening tests continued to result in equivocal data, the USEPA decided to evaluate the 52 chemicals using the more definitive, scientifically defensible, approach of Weight of Evidence (WOE). Where these tests resulted in potential ED effects, the exposure used in those tests is so unrealistically high, endocrine disruption in a human would require, if real, exposure to substantially higher levels of the chemical than that used for vector control.

There have also been reported adverse effects on bees and butterflies. However, the impacts reported have generally been associated with indirect effects from foraging on treated vegetation (e.g., milkweed loss for butterflies) and effects outside of recommended label uses (Agrawal, et a; 2015). Concerns about endocrine disruption by glyphosate are not verified and this chemical is only one of the dozens of chemicals USEPA is suggesting may have an EDC role. No significant indication of this mode of action has been reported at this time. Some reports of sub-lethal effects on disease resistance, biological diversity, enzyme activity, and increased use of genetically engineered foods are interesting but without clear mechanisms that can be related directly to glyphosate. Because the WHO publication has received so much attention, this claim has been considered, but it is clearly not supported by the work of several other researchers (Rhomberg and Goodman. 2012; Mink et al. 2012) who do not attribute any carcinogenic effects to humans from potential exposure to glyphosate.”.

In response to the WHO declaration that glyphosate is a “probable carcinogen,” numerous scientists have called the designation into question. It has been shown that the WHO panel ignored negative results available to them. One critical report on the WHO designation is provided by an independent study by four expert panels that did a comparison of the results presented by the WHO panel but included other reports with conflicting conclusions (Williams et al. 2016). The reports and data reviewed by WHO were supplemented by reports and data provided to WHO but not used in their report (reasons for rejection of those data by WHO were not supported by typical scientific discipline):

> “*We decided to remove it because … you couldn’t put it all in one paper*.” Aaron Blair, former epidemiologist at the US National Cancer Institute, explaining why new data on glyphosate and cancer were not reviewed or published by the WHO panel.

The overall weight of evidence from the genetic toxicology data supports a conclusion that glyphosate “does not pose a genotoxic hazard and, therefore, should not be considered support for the classification of glyphosate as a genotoxic carcinogen” (Williams et al. 2016). The assessment of the epidemiological data found that the data do not support a causal relationship between glyphosate exposure and NHL. In fact, The American Cancer

Society statistics list NHL as approximately 4 percent of all cancers and lists the following risk factors as contributing to development of this cancer: age, gender, ethnicity, geography, family history, as well as possible exposure to certain chemicals and drugs.

Substantial evidence, contrary to the IARC proclamation of carcinogenicity, supports the conclusion that impacts to human health from the use of glyphosate are not significant nor supported by all the data available to the IARC (Koutros et. al., 2018. Conflicting information, suggesting that glyphosate is not carcinogenic, has been reported by the three other WHO agencies, including the WHO International Programme on Chemical Safety, WHO Guidelines for Drinking Water Quality and the WHO Core Assessment Group. Further, a 2018 report by Tarone, who is an accredited statistician, was critical of the IARC findings of glyphosate being a probable carcinogen and indicated that a re-examination of the animal studies cited by IARC resulted in a contrary finding. The author concluded that the data used was scientifically deficient and could not corroborate the finding by the WHO panel on glyphosate. Tarone, and others (European Chemicals Agency, EPA c), reported that the IARC panel highlighted certain positive results from rodent studies, which they relied upon in the deliberations, but ignored contradictory negative results from the same studies, and an inappropriate statistical test was used. The author concluded that when all of the relevant data from the rodent carcinogenicity studies of glyphosate are evaluated together, it is clear that there is not sufficient evidence supporting the notions that glyphosate as an animal carcinogen. Even a conclusion that there are low levels of animal carcinogenicity would be difficult to support (Tarone 2018). The process of evaluation and registration of herbicides and pesticides used by the Authority is overseen by the USEPA, which released a draft risk assessment in December 2017 concluding that "glyphosate is not likely to be carcinogenic to humans" (USEPA 2017).

Regardless of verdicts in the recent litigation about RoundUp connections to the onset of cancer, trial court cases, especially one decided by a jury, is not the same as scientific consensus. Jurists are not scientists and are dependent upon the information and material provided by the attorneys in court. The USEPA's current draft risk assessment for glyphosate states "The draft human health risk assessment concludes that glyphosate is not likely to be carcinogenic to humans. The Agency's assessment found no other meaningful risks to human health when the product is used according to the pesticide label. The Agency's scientific findings are consistent with the conclusions of science reviews by a number of other countries as well as the 2017 National Institute of Health Agricultural Health Survey" (USEPA 2017). As with the potential use of any chemical by the Authority, if new information about the potential risk of a product becomes available, and it is shown that a scientific consensus indicates that a credible or even a hypothetical risk may be related to the use of the product could present a significant human health risk, it would be re-evaluated for use by the Authority.

Table 5. Differences of Cancer Classifications of Glyphosate

HHS	Carcinogenicity Classification	No Data	NTP 2016
EPA	Carcinogenicity Classification	Group D	IRIS1989
IARC	Carcinogenicity Classification	Group 2A	IARC 2017

Source: WHO (World Health Organization) 2009.

Scythe (Pelargonic Acid)

Broad-spectrum control of many annual, biennial, and perennial broadleaf weeds.

Spray (backpack or boom on ATV)

Scythe

CAS No 112-05-0

Pelargonic Acid (nonanoic acid)

Liquid colorless to yellow, waxy. Stable under most conditions

Practically nontoxic to birds, fish, and honeybees

it is a natural component of many human diets. The acute toxicity of pelargonic acid is very low, except for moderate, but reversible, eye irritation

Mode of Action

Pelargonic acid, also known as nonanoic acid, is a naturally occurring fatty acid found in plants and animals (USEPA 2000). When applied to growing plants in sufficient quantities, pelargonic acid rapidly desiccates green tissue by removing the waxy cuticle of the plant and disrupting the cell membrane, resulting in cell leakage, causing tissue death. It is not translocated in treated plants and provides no residual weed control. It is only effective as a post-emergent herbicide and provides burndown of both annual and perennial broadleaf and grass weeds and most mosses. USEPA registered pelargonic acid in 1992 and Scythe was registered in 1998 USEPA, as an herbicide. Even with the designation as an herbicide, the Food and Drug Administration (FDA) has approved the active ingredient pelargonic acid as a food additive. The FDA considers it safe for human consumption

Environmental Fate and Transport

Pelargonic acid occurs naturally in many plants, including food plants, so most people are regularly exposed to small amounts of this chemical. Pelargonic acid is short-lived in the environment and is rapidly dissipated and degraded via several pathways. In soils, microbial activity is the primary degradation process, with an estimated aerobic soil half-life of less than one day (USEPA 1992). Ninety-seven percent of pelargonic acid applied to loam was degraded within two days. (NYSDEC 1998). Pelargonic acid does not hydrolyze in water but will volatilize from water over time if microbial degradation or adsorption to sediments does not occur.

Pelargonic acid can be transported away from an application site or degrade in soil, water and air through a number of different chemical or biological processes. The most important processes for dissipation of pelargonic acid are microbial biodegradation, volatilization, and adsorption to soils and sediments. Pelargonic acid adsorbs strongly to soils and is not considered to be a potential groundwater contaminant. Plants treated with pelargonic acid do not translocate the chemical though foliage or roots of the plant.

Pelargonic acid does not show adverse effects on non-target organisms or the environment. Toxicity tests on non-target organisms, such as birds, fish, and honeybees, revealed little or no toxicity. The chemical decomposes rapidly in both land and water environments, so it does not accumulate. Because pelargonic acid is a broad spectrum herbicide, it could harm non-target plants if spray drifts beyond the intended target area.

Human Toxicology

USEPA has given Scythe an acute hazard warning label of "*Warning*", placing it in Category II. This rating means that the product is considered to be "Moderately toxic." Exposure to skin or eyes may cause moderate skin irritation and substantial but temporary eye irritation. It is harmful if inhaled. Most of the data on pelargonic acid's toxicity and potential risk of adverse health effects are in unpublished studies that are not available to the public. The USEPA Registration Eligibility Decision (RED) for soap salts (USEPA 1992) and the Federal Register (2004, 2008) only provide very brief summaries of the primary toxicology data. There are few epidemiological studies of the effects of pelargonic acid in humans because it is a natural component of many human diets. The acute toxicity of pelargonic acid is very low, except for moderate, but reversible, eye irritation (Category II). Oral acute toxicity is very low (Category IV) and dermal and inhalation toxicities are Category III. Although it is a skin irritant, it is not a sensitizer.(Ku HO, Jeong, SH, et al. 2008) Because of the low toxicity and the common occurrence of naturally occurring pelargonic acid in the diet, USEPA has not developed an RfD for an acceptable dose to humans.

Ecological Toxicology

Acute and chronic pelargonic acid toxicity to mammals is low, with no adverse effects observed in studies with laboratory animals up to doses of 1,500 mg/kg-day. Pelargonic acid is not acutely toxic to birds, slightly toxic to insects, highly toxic to soil fungal microbes and to the leaf tissue of terrestrial plants. Pelargonic acid is classified by USEPA as not acutely toxic to fish and amphibians, highly to slightly toxic to aquatic invertebrates and not acutely toxic to aquatic plants (USEPA 1992). Although extensive toxicology data are not available for pelargonic acid, the fact that this active ingredient is a naturally occurring component of plants and animals suggests that exposures to this chemical are unlikely to cause adverse effects (EFSA 2013).

Most of the data on toxicity of pelargonic acid to animals is from studies conducted in laboratory animals in support of USEPA registration of soap salts (USEPA 1992), pelargonic acid (Federal Register 1997, 2003), its ammonium salt (Federal Register 2008), and decanoic acid (Federal Register 2003). Because pelargonic acid is a common part of the mammalian diet, its metabolism has been studied extensively as part of research on fat metabolism. No systemic toxicity is anticipated at doses comparable to the levels normally found in the diet, and none was found in subchronic toxicity studies up to doses of 2,000 mg/kg-day. Pelargonic acid is rapidly absorbed through the skin and is a moderate to severe eye and skin irritant. It has low acute oral and inhalation toxicity. Because of its low toxicity, common occurrence in the diet, and known metabolic pathway, pelargonic acid was not evaluated by USEPA for carcinogenicity or chronic toxicity.

Pelargonic acid has very low acute toxicity, and the dermal and oral LD50 in rats and rabbits is > 5,000 mg/kg.(USEPA 1992). Fatty acids and their salts were found to be mild to moderately irritating to rabbit skin when small amounts were applied; in humans, pelargonic acid was found to be a moderate skin irritant. The ammonium salt of pelargonic acid can cause severe eye irritation. USEPA places technical pelargonic acid in Category II (moderately toxic) for primary eye irritation, Category IV (not acutely toxic) for acute oral toxicity, and Category III (slightly toxic) for acute dermal and inhalation toxicity (Federal Register 2003).

One chronic toxicity test treated mice dermally with 50 mg of pelargonic acid twice per day for 80 weeks (Federal Register 2003). Histopathology showed no non-neoplastic or neoplastic lesions on the skin and internal organs. Pelargonic acid was found to be non-mutagenic in the Ames Test (Salmonella/reverse mutation assay, Federal Register 2003).

Available toxicity data indicate low acute and short-term toxicity to birds and. No reproductive toxicity data are available. However, on the basis that fatty acids are readily biodegradable and are an essential component of the diet of birds and mammals, a low reproductive risk is likely. Toxicity to fish (acute and chronic), aquatic invertebrates (chronic), and algae for exposure to potassium salts of fatty acids is low. Pelargonic acid is relatively non-toxic to waterfowl and upland game birds (Federal Register 2004). Most of the toxicity information is taken from the USEPA RED for soap salts. The RED also includes LD50 values of >2,000-2,250 and >2,510 for bobwhites and mallards. The USEPA adjusts the toxicity estimates for endangered species by dividing the LC50 by six (or 20 in the case of salmonids).

The sub-chronic toxicity of pelargonic acid is low, and no systemic toxicity was observed in mammals at oral doses of 2,000 mg/kg-day or less (Federal Register 2003). USEPA’s requirement for a 90-day subchronic study was waived on the basis of low toxicity observed in the preliminary study and the natural occurrence of fatty acids in the human diet. Dermal doses of 500 mg/kg-day for 10 days caused severe skin irritation and swelling during the treatment, but the skin was healed two weeks after exposure ceased. No systemic effects were observed. Several sub-chronic studies for the closely related capric (decanoic) acid were also available (Federal Register 2003).

There are two toxicity studies using the African-clawed frog (Xenopus laevis) for pelargonic acid and two for decanoic acid. If the frogs are exposed for 96-hours to pelargonic acid the concentrations of product that will result in 50% mortality (EC50) are 24 and 32.7 mg/L for decanoic and pelargonic acid, respectively. Minor, but not significant effects on development and metamorphosis were observed in these studies. When exposed to these two chemicals for 96 hours the dose that results in 50% mortality (LC50) are 7.5 and 6.5 mg/L for decanoic and pelargonic acid, respectively (USEPA Ecotox).

Telar (Chlorsulfuron)

Pre-and post-emergent broadleaf weed control
Cut-stump, spray (backpack or boom on ATV), wicking
Telar
CAS No. 64902-72-3
Chlorsulfuron
Light tan to brown, granular with a mild odor
Very low toxicity to rats, no evidence of mutagenicity, carcinogenicity or reproductive toxicology.
Relatively low toxicity to mammals and shows no mutagenic or teratogenic potential. It can be an eye and skin irritant, but is not a dermal sensitizer
Very low toxicity to birds, fish, bees

Mode of Action

Control of broad leaf weeds in several varieties of forage brassicas. TELAR® XP is absorbed by both the roots and foliage of plants, rapidly inhibiting the growth of susceptible weeds. Two to 3 weeks after application to weeds, leaf growth slows, and the growing points turn reddish-purple. Within 4 to 6 weeks of application, leaf veins and leaves become discolored, and the growing points subsequently die

Environmental Fate and Transport

Chlorsulfuron is moderately mobile in soil at low pH, but very mobile at high pH. Chlorsulfuron is moderately persistent in the environment. Degradation half-lives vary primary with pH, from a few weeks to over one year in soil at high pH. Due to its solubility in water, chlorsulfuron does not bioaccumulate. Degradation by hydrolysis is the most likely route for degradation in acidic environments (23 day half-life at pH = 5). Chlorsulfuron is stable to hydrolysis at neutral to high pH. Degradation half-lives in soil environments range from 14 to 320 days.

Human Toxicology

Chlorsulfuron is not acutely toxic via the oral and inhalation [Toxicity Category IV] routes of exposure and via the dermal [Toxicity Category III] route of exposure. Adequate data are not available for all routes of exposure. Possible eye or skin irritation, slight dermal sensitization. Rat LD50 >5,000 mg/kg for both dermal and oral exposures. Did not cause sensitization to laboratory animals., guinea pig Inhalation > 5.5 mg/l, At extreme exposures reduced body weight gain, kidney effects, spleen effects, bloody urine, bone marrow changes. Dog oral exposures: abnormal decrease in number of red blood cells, a slight increased incidence in tumors was observed in one species, but not in other species. Not classifiable as a human carcinogen. Animal testing did not show any mutagenic effects. Tests on bacterial or mammalian cell cultures did not show mutagenic effects. no toxicity effects on reproduction. Animal testing showed effects on embryo-fetal development at levels equal to or above those causing maternal toxicity

Ecological Toxicology

Chlorsulfuron is practically nontoxic to both freshwater and estuarine/marine fish on an acute exposure basis and is slightly toxic to estuarine/marine invertebrates. Chronic exposure of rainbow trout (*Oncorhynchus mykiss*) to chlorsulfuron resulted in a No Observed Effect Concentration (NOEC) of 32 mg/L while a chronic study of water fleas (*Daphnia magna*) resulted in a NOEC of 20 mg/L. Table 6 summarizes the most sensitive endpoints used in the risk assessment of aquatic animals. Moderate toxicity to Rainbow Trout (96-hr LC50 > 250 mg/L), Sheepshead Minnow (LC50)> 980 mg/L) Oysters (EC50) 385 mg/L, Daphnia EC50 > 370 mg/L, Green Algae EC50 0.055 µg/L.

Toxicity to Mallard duck Oral LD50 >5,000 mg/kg, Bobwhite and Japanese quail Oral LD50 > 5,000 mg/kg, us, rabbit Oral LD50 >2,000 mg/kg, rat and rabbit slight skin irritation. Inhalation LC50 >5.5 mg/l, rat. A slight increased incidence in tumors was observed in one species, but not in other species. No genetic damage in cultured bacterial cells or genetic damage in animals. No reproductive toxicity in animals. No effects on embryo-fetal development at levels equal to or above those causing maternal toxicity.

Transline (clopyralid)

Used for thistles, knapweeds, locust, kudzu

Cut-stump, spray (backpack or boom on ATV), wicking

Transline

CAS No. 566191-89-7

Clopyralid 3,6-dichloroo-2-prridinecarboxylic acid.

nonvolatile and highly water soluble. Can be flammable as vapor

Liquid red to brown with sweet odor.

Very low toxicity to rats, no evidence of mutagenicity, carcinogenicity or reproductive toxicology.

Low toxicity to fish, birds and aquatic invertebrates

Mode of Action

Clopyralid is a selective herbicide used for broadleaf noxious weed control, and it is the active ingredient in Transline. It is structurally similar to aminopyralid, which has an extra amino group, and it is also an auxin hormone mimic, causing abnormal growth that impairs proper nutrient transport throughout the plant. It is highly selective for terrestrial plants and appears to be relatively non-toxic to aquatic plants (Syracuse Environmental Research Associates, 2004).

Environmental Fate and Transport

Clopyralid is relatively nonvolatile and highly water soluble. It is stable to both hydrolysis and photolysis in aqueous systems but is degraded rapidly. It is degraded in soil primarily through microbial activity (t ½ = 40 days), and carbon dioxide is the major breakdown product (USDOE, 2000). It is very stable under anaerobic conditions. It is mobile and does not bind tightly to soil. Clopyralid is very stable in compost piles, and thus is no longer used for lawn and garden applications in California and Washington

Human Toxicology

Clopyralid is listed as a Category III compound for oral, dermal, and inhalation toxicity. The oral and dermal mammalian LD50s are both >5,000 mg/kg, and the mammalian inhalation LC50 is >1.3 mg/L. It is not metabolized extensively; 79-96% of parent clopyralid is excreted in rat urine (t ½ = 3 h) (Syracuse Environmental Research Associates, 2004). The NOEL in dogs is 100 mg/kg/day. Clinical signs of acute clopyralid poisoning include neurotoxicity, manifested as ataxia, tremors, convulsions, and weakness. Chronic studies in rats, mice, and dogs have noted general decreases in body weight and increases in liver and kidney weight, which are commonly observed in chronic toxicity studies and can indicate either an adaptive or toxic response. The USEPA OPP has established an acute RfD of 0.75 mg/kg/day and a chronic RfD of 0.15 mg/kg/day for clopyralid.

The USEPA classifies clopyralid as a Group E human carcinogen (no evidence of carcinogenicity) because chronic studies in rats, mice, and dogs have shown no indication of carcinogenicity. However, technical grade clopyralid contains low levels of hexachlorobenzene (<2.5 ppm), which is classified as a potential human carcinogen (Syracuse Environmental Research Associates, 2004).

Recent panel reviews by European Food Safety Authority (EFSA 2017, 2018) considered the status of clopyralid in Europe based on earlier risk assessments (2012) to consider the renewal of the registration of clopyralid as an herbicide on winter cereals and grassland. The panel's review of the available risk assessment information did not substantially alter the mammalian and toxicity information. The acute and long-term risk to birds and mammals from oral exposure via residues in food items and contaminated drinking water was assessed as low. No risk assessment for secondary poisoning was triggered based on the low log Pow (< 3). Numerous recent publications refining the information about clopoyralid were identified but none that would substantially alter the basic information or characterization of the potential effects of clopyralid use by the Authority.

Ecological Toxicology

Clopyralid is practically non-toxic to slightly toxic to birds. The oral LD50 in mallard duck is >1,645 mg/kg. The dietary LC50 for both pure clopyralid and the monoethanolamine salt of clopyralid is >4,460 ppm in both bobwhite quail and mallard ducks. Clopyralid is also practically non-toxic to fish and aquatic invertebrates. The 96-h LC50 in bluegill is 125 mg/L, and the LC50 in rainbow trout is 103 mg/L for technical grade clopyralid. The monoethanolamine salts are even less toxic to fish, with LC50s ranging from 700-1,645 mg a.i./L. There is no indication that clopyralid bioaccumulates in fish. The LC50 in *Daphnia* is 225 mg/L. In a chronic *Daphnia* reproduction study, the NOAEL was found to be 23.1 mg a.i./L (Syracuse Environmental Research Associates, 2004). Clopyralid is also practically non-toxic to honeybees; the contact LD50 is >100 µg/bee. Clopyralid residues are highly toxic to non-target broadleaf plants.

Vista XRT (fluroxypyr)

Broadleaf weeds and brush on rangeland and pasture, rights-of-way (roadsides, electric utility, pipelines, railroads and more

Cut-stump, spray (backpack or boom on ATV), wicking

Vista XRT

CAS No. 81406-37-3

Fluroxypyr 1-methylheptyl ester

Yellow liquid with a spicy odor

Very low toxicity to rats, no evidence of mutagenicity, carcinogenicity or reproductive toxicology.

Low toxicity to fish, birds and aquatic invertebrates

Mode of Acton

Provides post emergence control of kochia (including ALS and dicamba-resistant biotypes), lespedeza, prickly pear, and other hard-to-control broadleaf weeds and brush on rangeland and pasture, rights-of-way (roadsides, electric utility, pipelines, railroads and more), industrial sites, non-irrigation ditch banks, conifer and tree plantations, and grazed areas in and around these sites. The herbicide is rain-fast one hour after application. Selective to broadleaf plants, will not harm grasses, and is not soil-active so may be applied under the canopy of desirable trees. Not harmful to seedling grasses and can be used to control kochia in grass restorations (Weinzierl and Henn, 2000).

Environmental Fate and Transport

Fluroxypyr biodegradation may occur under aerobic conditions. Based on stringent OECD test guidelines, this material cannot be considered as readily biodegradable; however, it is biodegradable under most environmental conditions. Photodegradation half-life of fluroxypyr is 0.486 days. Exposure to elevated temperatures can cause product to decompose with the generation of gas during decomposition. Decomposition products can include and are not limited to hydrogen chloride, hydrogen fluoride and nitrogen oxides (USEPA 2006)

Human Toxicology

Acute oral toxicity Very low toxicity if swallowed. LD50, Rat, female, > 5,000 mg/kg No deaths occurred at this concentration. Acute dermal toxicity Prolonged skin contact is unlikely to result in absorption of harmful amounts. Acute inhalation toxicity No adverse effects are anticipated from single exposure to mist. Based on the available data, respiratory irritation is not an issue (LC50, Rat, male and female, 4 Hour, dust/mist, > 5.50 mg/l). No evidence of reproductive toxicity, mutagenicity, or genetic toxicity (USEPA 2006).

Ecological Toxicology

Teratogenicity seen in some high doses that are toxic to the mother but no evidence of birth defects. Highly toxic to fish and aquatic organisms (LC50/EC50 between 0.1 and 1 mg/L in the most sensitive species tested). LC50, Oncorhynchus mykiss (rainbow trout), flow-through test, 96 Hour, 14.3 mg/l. Acutely toxicity to aquatic invertebrates, EC50, Daphnia magna (Water flea), static test, 48 Hour, 20 mg/l. Acutely toxic to algae/aquatic plants (green algae). Practically non-toxic to birds (LD50 > 2000 mg/kg), oral LD50, Colinus virginianus (Bobwhite quail), > 2,250 mg/kg, moderately toxic to earthworms.

Weed Zap (cinnamon clove)

small broad leaf and grassy weeds
Cut-stump, spray (backpack or boom on ATV), wicking
Weed Zap
CAS No. 8015-91-6 8000-34-8
Cinnamon oil and Clove Oil
Yellow amber color, liquid, cinnamon and clove odor
Essentially non-toxic, used as food items
No evidence of carcinogenicity, mutagenicity, or reproductive effects.

Mode of Action

Weed Zap® is a non-selective contact herbicide, effective for extended times, effective on small broad leaf and grassy weeds and is nontoxic to non-green, woody plant parts. It is essentially nontoxic to humans and wildlife as it is a combination of naturally occurring substances(JHB 2015, Safer Gro 2015).

Environmental Fate and Transport

100% biodegradable with long lasting residual effects. Relatively stable liquid dissipates under normal conditions. There are no reported long lasting bi-products or metabolites of the product.

Human & Ecological Toxicology

Weed zap is not known to be toxic, but may cause eye or skin irritation. Not known to be carcinogenic. Not known to be corrosive. Not known to be mutagenic. Not known to cause skin sensitization. Not known to cause reproductive harm. It is essentially nontoxic to humans and wildlife as it is a combination of naturally occurring substances. Composed of naturally occurring food grade ingredients, so it is safe to use around children and pets.

Rodenticides (Cholecalciferol)

Control Norway rats, roof rats, and house mice
pellets and blocks Tamper proof bait container
Agrid3, Quintox, Terad3
CAS No. 67-97-0 (434-16-2)
Cholecalciferol, vitamin D3
Granular formulations, blocks can be green, yellow and black
Slightly toxic to birds, very toxic to rodents

Mode of Action

Cholecalciferol is used to control Norway rats (*Rattus norvegicus*), roof rats (*Rattus rattus*), and house mice (*Mus musculus*) in and around homes, industrial buildings and similar man-made structures, in and around agricultural buildings, including swine, poultry, cattle and dairy facilities, warehouses and food storage areas; in transport vehicles (ships, trains and aircraft) and in and around related port and terminal buildings; and in alleys. Formulation types include pellets and blocks (Clock-Rust and Sutton 2011). Cholecalciferol is a sterol (vitamin D3) and its ingestion results in hypercalcemia from mobilization of calcium from bone matrix into blood plasma leading to metastatic calcification of soft tissues (Clock-Rust and Sutton 2011).

It is generally applied as food bait blocks or pellets. The mode of action of cholecalciferol differs from the other rodenticides examined herein in that it is not an anticoagulant. Rather, cholecalciferol baits deliver a toxic dose of vitamin D to pests. Although it is highly toxic to target rodents, cholecalciferol is considered of low hazard to non-targets such as birds or domestic dogs.

Environmental Fate and Transport

The environmental fate of cholecalciferol is not well described. Based on physical/chemical properties of cholecalciferol, it is expected to be nonvolatile, essentially insoluble in water and immobile in soil (Clock-Rust and Sutton 2011). Information on biotic and abiotic degradation was not available.

The parent compound and metabolites are fat soluble and stored in adipose tissue. Enterohepatic recirculation of cholecalciferol and metabolites occurs. After a massive intake of cholecalciferol, excess calcifediol is produced in the liver. Because of their high lipid solubility, cholecalciferol and its metabolites are eliminated from the body very slowly (primarily through bile and feces). Two mechanisms occur with consumption of large doses of cholecalciferol. First, more calcium is absorbed from the intestines. Second, cholecalciferol metabolites stimulate phosphorus transfer from bone to plasma. The increased plasma calcium concentrations result in vomiting, lethargy, and muscle weakness. Specific organ effects include acute renal tubular necrosis, gastrointestinal stasis, gastric acid secretion, decreased skeletal muscle responsiveness, and decreased neural tissue responsiveness (Kahn and Schell 2019). The increase in plasma calcium causes soft tissue mineralization resulting in loss of functionality of kidneys, cardiac muscle, etc. (Morrow 2001).

Human Toxicity

Cholecalciferol is acutely toxic to target rodents. The oral LD50 for cholecalciferol dissolved in corn oil is 42.5 mg/kg for mice and 43.6 mg/kg for rats. The dermal LD50 of the finished bait product (0.075 percent cholecalciferol) is 2,000 mg/kg for rabbits (Marshall 1984).

Ecological Toxicity

Cholecalciferol is considered of low hazard to avian and canine species. The oral LD50 for dogs is 88 mg/kg. The oral LD50 for mallard ducks and bobwhite quail is 2,000 mg/L (Marshall 1984). When used in bait form, cholecalciferol may directly impact sensitive species such as non-target rodents (Clock-Rust and Sutton 2011, Erickson and Urban, 2004). Cholecalciferol is not expected to bioconcentrate since it is metabolized in mammals (Clock-Rust and Sutton 2011). Based on the reported usage, using BMP application practices, these products should not result in unwanted adverse effects.

Insecticides and Common Products

Advion Gel Baits (Indoxacarb)

Structural pests such as ants and cockroaches.
Tamper proof bait container
STEWARD, AVAUNT
CAS No. 173584-44-6
(S)-methyl 7-chloro-2,5-dihhydro-2-diehydro-2-[[(methoxycarbonyl) [4-(trifluoromethoxy) phenyl]amino]carbonyl]1,2-e][1,3,4]pxadoazome-4a(3H)-carboxylate
White powder
Slightly toxic to mammals, moderate eye irritant, no evidence that indoxacarb is carcinogenic or mutagenic
Moderately toxic to birds, moderately to very acutely toxic to freshwater, estuarine, and marine fish.

Mode of Action

Indoxacarb is the active ingredient in Advion gel baits. It is proposed for use on structural pests such as ants and cockroaches. Has both larvicidal and ovicidal activity. It functions by blocking sodium channels, leading to impaired nerve function, paralysis, and ultimately death of lepidopteran pests (USEPA, 2000, USEPA 2015). It becomes toxic after metabolism. It is designated by the USEPA as a reduced risk pesticide and is considered a substitute for organophosphates (USEPA, 2000 USEPA 2015). Formulations often contain indoxacarb and its metabolites.

Environmental Fate and Transport

Indoxacarb is relatively non-volatile and has a low vapor pressure. In water, it is degraded primarily via photolysis, and to a lesser extent, hydrolysis (the hydrolysis half-life is about ten times longer than the photolysis half-life of three days). It is immobile in soil and is also moderately persistent under both aerobic and anaerobic conditions. It is moderately persistent wit aerobic half-life ranging from 3 to 693 days and 147 to 233 days in anerobic conditions. It is also susceptible to microbial degradation. (California Department of Pesticide Regulation, 2006). Excessive use can result in runoff that is moderately toxic to mammals, bird, fish, and aquatic invertebrates.

Human Toxicity

Indoxacarb is classified as a Category II oral toxicant; the rat acute oral LD50 is <1,000 mg/kg, with large variation in toxicity between male and female rats (843 and 179 mg/kg, respectively). It is Category IV for dermal and inhalation toxicity; the rat dermal LD50 is >5,000 mg/kg and the inhalation LC50 is >5.5 mg/L. It is a moderate eye irritant (Category III). In a 90-day oral toxicity study in dogs, the LOAEL was determined to be 19 mg/kg/day based on impacts to various blood parameters. There is no evidence that indoxacarb is carcinogenic or mutagenic (California Department of Pesticide Regulation, 2006; USEPA, 2000).

Ecological Toxicity

Indoxacarb is moderately toxic to birds. The LD50 in bobwhite quail is 98 mg/kg, and the subacute 5-day LC50 in bobwhite quail is 808 mg/kg in the diet. It is moderately to very acutely toxic to freshwater, estuarine, and marine fish. The LC50s for rainbow trout, carp, and channel catfish are 0.65, 1.02, and 0.29 mg/L, respectively. It is moderately to very highly acutely toxic to freshwater, estuarine, and marine invertebrates. The acute LC50s in *Daphnia carinata* and *Daphnia magna* are 2.94 and 0.60 mg/L, respectively. The LC50 in oyster is 0.203 mg/L, and the LC50 in mysid shrimp is 0.0542 mg/L. Chronic toxicities range from 0.003 to 0.25 mg/L for fish and invertebrates (California Department of Pesticide Regulation, 2006). Indoxacarb is practically non-toxic to honeybees by dietary intake but is highly toxic by contact (LD50 = 0.18 µg/bee).

Diatomaceous Earth (silica)

Dusting agent to cover areas for ants and crawling pests
dehydrating drying mode of action
Amorphous Silica, Diatomite
CAS No 91053-39-3
powder containing about 80%-90% silica, insoluble in water
essentially non-toxic in its natural form

Mode of Action

Diatomaceous earth is a powder containing about 80%-90% silica. Diatomaceous earth is thought to kill insects by dehydrating them or drying them out. The powder formulation allows liquids to flow.

Diatomaceous earth is a natural compound that also functions through disrupting the water balance of insects. It is practically non-toxic to humans and wildlife, and therefore is not of environmental concern. The USEPA has identified it as a compound to deregulate due to its lack of toxicity. There are no restrictions or regulations that address diatomaceous earth.

DE works by mechanically abrading an insect's exoskeleton that leads to dehydration and eventual death of the insect. DE is non-selective so it must be used only in specific areas where the target pests travel. The dusts must be applied in areas where they will make contact with the bodies of insect pests.

Environmental Fate and Transport

Diatomaceous earth is insoluble in water and is often used to cleanse particulates from water. It is essential non-toxic in its natural form. It is categorized as Category IV overall by USEPA (USEPA 2003). In all forms, DE persists until physically disturbed.

Human Toxicity

DE is very low toxicity to humans (LD50 in rats >5,000 mg/kg); the dermal LD50 is >2,000 mg/kg; and the acute inhalation LD50 is > 0.859 mg/L, the highest dose tested in the referenced study (USEPA, 1984). Diatomaceous earth may cause mild eye and skin irritation in some people.

Reports of adverse effects of extreme exposure to silica products are limited. Available studies are focused on industrial production and other scenarios not relevant to the proposed uses by the Authority.

Ecological Toxicology

Reports of adverse effects of extreme exposure to silica products are limited. Available studies are focused on industrial production and other scenarios not relevant to the proposed uses by the Authority.

Garden Safe Soap Spray (potassium salts)

Control of insects and mosses, algae, lichens, liverworts and other weeds
Targeted Spray for insect control
Potassium salts of fatty acids
potassium laureate, potassium myristate, potassium oleate, and potassium ricinoleate.
CAS No. 947173-77-5
Clear, brown liquid with slight smell of citrus and garlic
low oral and dermal toxicity to mammals, general stomach upset in humans, irritating to the skin and eyes.
practically nontoxic to birds but slightly toxic to fish and highly toxic to aquatic invertebrates

Mode of Action

Potassium salts of fatty acids are used as insecticides, acaricides, herbicides and algaecides. They are used to control a variety of insects and mosses, algae, lichens, liverworts and other weeds, in or on many food and feed crops, ornamental flower beds, house plants, trees, shrubs, walks and driveways, and on dogs and cats. Potassium salts of fatty acids include potassium laureate, potassium myristate, potassium oleate, and potassium ricinoleate. These salts are degraded quickly in soil by microbes, and do not persist in the environment (USEPA 1992).

Environmental Fate and Transport

Commonly referred to as “soap salts”. They are produced by adding potassium hydroxide to fatty acids found in plant or animal oils. Fatty acids are extracted from palm, coconut, olive, castor, and cottonseed plants (National Pesticide Information Center 2001). Fatty acids penetrate an insect’s body covering and disrupt the cell membranes. The insect dies of dehydration. Soft-bodied insects, such as aphids, are more susceptible as are immature insects.

Potassium salts degrade quickly in the environment. They are of low toxicity to birds and mammals, but highly toxic to fish aquatic non-target invertebrates. The Districts did not use potassium salt products during the reporting year; therefore, when needed, using BMP application practices, these products should not result in unwanted adverse effects.

Human Toxicity

Soap salts have low oral and dermal toxicity to mammals but may cause general stomach upset in humans. They may be irritating to the skin and eyes (USEPA 1992). These products are generally considered safe by the FDA. The USEPA classifies soap salts as Category IV (lowest level of toxicity) for acute effects (Table 6).

Ecological Toxicity

Soap salts are practically nontoxic to birds but slightly toxic to fish and highly toxic to aquatic invertebrates (USEPA 1992). Pesticides containing potassium salts of fatty acids are used in a wide array of outdoor sites; however, the compounds degrade very quickly in soil. Because soap salts are not applied directly to water, they pose little threat to sensitive aquatic invertebrates (USEPA 1992).

Gentrol Point (Hydroprene)

Targeted Spray
Bait container foam product
Gentrol Point, NyGaurd
(S) Hydroprene Ethyl(2E,4E,7S)-3,7,11-trimethyl-2,4-dodecadienoate
CAS No. 65733-18-8
Clear round plastic station with a faint fruity odor, stable
Slightly to moderately toxicity to mammals, no evidence of mutagenicity, teratogenicity, or reproductive effects

Mode of Action

Hydroprene is an insect growth regulator that functions by mimicking insect juvenile hormones. It is the active ingredient in Gentrol Point Source and is used against cockroaches, beetles, and moths. It is not applied to plants. Although they do not poison an insect directly to cause a lethal effect, they do interrupt the development cycle of juvenile cockroaches, so they do not ever reach a reproductive stage. This mode of action can be important to reducing adult populations by preventing young insects from reaching adulthood and breeding. For this same reason, hydroprene is considered highly specific to insect pests and has low toxicity for birds and mammals, species that do not possess these same types of growth hormones. IGRs are not an ideal stand-alone control, but they are effective when used in combination with other methods to reduce populations of troublesome insects

Environmental Fate and Transport

There is a paucity of data regarding the environmental fate and transport of hydroprene because it is only used indoors. Thus, the EPA does not anticipate any contamination of drinking water. Hydroprene is insoluble in water, and it is rapidly degraded in soil (National Pesticide Information Center, 2001).

Human Toxicity

Hydroprene is listed as a Category IV oral toxicant and Category III for dermal and inhalation routes of exposure. The mammalian oral and dermal LD50s are both >5,000 mg/kg, and the inhalation LC50 is >5.2 mg/L. The USEPA has now determined that the parental toxicity LOAEL is 7,500 ppm for the rat reproductive toxicity study based on parental weight gain reductions (Federal Register, 1997). In a three-month feeding study in rats, the LOAEL based on vacuolated ovarian luteal cells in females was 250 mg/kg/day. There is no evidence for genotoxicity or mutagenicity. Based on chronic rat studies, the RfD for hydroprene is 0.1 mg/kg/day (Federal Register, 1997).

Ecological Toxicity

There are no data available regarding the toxicity of hydroprene to birds. It is practically non-toxic to fish, with LC50s > 100 mg/L. It is practically non-toxic to adult honeybees by oral and contact routes (LD50 >1,000 µg/bee); however, it is highly toxic to larval honeybees (LD50 = 0.1 µg/bee) (Federal Register, 1997).

MaxForce Baits (Fipronil)

Bait gel for control of roaches, ants and crawling insects.
Sealed Bait stations.
MaxForce Baits
1H-Pyrazole-3-carbonitrile, 5-amino-1-[2,6-dichloro-4-(trifluoromethyl)phenyl]-4-[(trifluoromethyl)sulfinyl]
CAS No. 120068-37-3
Flowable granular

Mode of Action

Fipronil is a non-systemic insecticide registered for use to control ants, beetles, cockroaches, fleas, mole crickets, ticks, termites, and other insects in a variety of agricultural and residential uses. It is functions by blocking GABA-gated chloride channels in the central nervous systems of pests. It is the active ingredient in Maxforce bait stations.

Environmental Fate and Transport

Fipronil is nonvolatile. It degrades rapidly, in a matter of hours, in water under UV light. The primary photodegradate is fipronil-desulfinyl. Under aerobic conditions in soil, it is subjected to microbial degradation, which results in the production of fipronil-sulfone (USEPA, 1996). It can also be hydrolyzed to form fipronil-amide. These breakdown products are persistent and immobile in soil (Jackson et al., National Pesticide Information Center).

Human Toxicity

Fipronil exhibits moderate acute toxicity (Category II) by the oral and inhalation routes in rats. The oral LD50 in rats is 97 mg/kg. The acute oral LD50 of fipronil-desulfinyl in rats is 15 and 18 mg/kg for females and males, respectively. The 4-h inhalation LC50 ranges from 0.390 to 0.682 mg/L in rats. By the dermal route, it is of moderate toxicity in rabbits, and low toxicity (Category III) in rats. The dermal LD50 is 354 mg/kg in rabbits and >2,000 mg/kg in rats. It is relatively non-irritating to the skin (Category IV) and eye (Category III) of rabbits and is not a dermal sensitizer. In a one-year chronic rat feeding study, responses included reduced feeding and food conversion efficiency, reduced body weight gain, seizures and seizure-related death, changes in thyroid hormones, increased mass of the liver and thyroid, and kidney effects. It is not mutagenic. However, fipronil has been classified as a Group C, possible human carcinogen, based on increases in thyroid follicular cell tumors in both sexes of the rat. Based on chronic rat studies, the chronic RfD. for humans is 0.0002 mg/kg/day (USEPA, 1996).

Ecological Toxicity

Fipronil is highly toxic to some birds. The LD50 in bobwhite quail is 11.3 mg/kg and in pheasants is 31 mg/kg. The five-day dietary LC50 in bobwhite quail is 49 mg/kg in feed. However, it is practically non-toxic to mallard ducks with no documented acute, sub-acute, or chronic effects. It is highly to very highly toxic to marine and freshwater fish. The 96-h LC50 is 0.246 mg/L for rainbow trout, 0.083 mg/L for bluegill sunfish, and 0.130 mg/L for sheepshead minnow. Fipronil-sulfone is three-six times more toxic than the parent compound in fish, and fipronil has been shown to bioconcentrate in fish. Fipronil is highly toxic to freshwater invertebrates. In Daphnia, the LOAEL is 20 µg/L, and fipronil-sulfone and fipronil-desulfinyl are almost seven and two times more toxic, respectively, than parent fipronil. It is highly toxic to honeybees by contact and ingestion when it is applied to plants (USEPA, 1996).

Terro Ant Bait (boric acid sodium tetraborate decahydrate)

Crawling insects, ants, termites
Bait Container, Dusting applications
Terro Ant Killer II.
Sodium tetraborate decahydrate
CAS No 10043-35-3
Low human toxicity, eye irritation possible, no evidence of mutagenicity, teratogenicity, immunotoxicity, neurotoxicity, or reproductive toxicity.
Practically nontoxic to slightly toxic to birds, fish, aquatic invertebrates, nontoxic to bees.

Mode of Action

Boric Acid Bait. Boric acid is a naturally occurring compound found in many fruits and vegetables, but at concentrated doses it can be an effective stomach poison for insects. Baits use low concentrations of boric acid sodium tetraborate decahydrate in the range of 0.55 percent to allow for ants to ingest the bait and take it back to the colony to share with other workers before there is a lethal effect. Higher concentrations risk killing the individual before it has time to take the bait back to the colony. it functions by disrupting the water balance of insects (DIAL Corp. 2005).

Environmental Fate and Transport

Due to the fact that significant amounts of boron are naturally present in soil and water, the fate and transport of borax is not well characterized. Boron salts also occur naturally in low concentrations in most unpolluted waterways. A R.E.D. was completed by the USEPA (1993) for boric acid and its salts. Subsequently, certain aspects of toxicity for boric acid and its salts were re-examined in a Tolerance Re-registration Eligibility Decision (TRED) (USEPA 2006, 2009). The most recent USFS risk assessment for borax, completed by SERA (2006), specifically assessed the fungicidal product Sporax®, which is 100% sodium tetraborate decahydrate. The USEPA has determined that, because boric acid and its sodium salts are of low toxicity and occur naturally, they should be exempted from the requirement of a tolerance (maximum residue limit) for raw agricultural commodities (USEPA, 1993). Additionally, relatively small amounts of borax and boric acid are used for pesticide purposes. Because of its small usage and low potential toxicity, very little experimental data exist for borax.

Human Toxicity

Borax is listed as a Category III compound for oral and dermal toxicity and skin irritation. For Prescription ant bait, the rat oral LD50 is >5,000 mg/kg, and the rabbit dermal LD50 is >5,000 mg/kg. (BASF, 2009) It is listed as a Category I eye irritant. USEPA has classified boric acid as a Group E carcinogen, indicating that there is evidence of no carcinogenicity to humans (USEPA, 1993).

Ecological Toxicity

Technical boric acid is practically nontoxic to birds, fish, and aquatic invertebrates, and it is relatively nontoxic to beneficial insects (USEPA, 1993).

While borax is used effectively in the control of fungi and insects, adverse effects to non-target insects and microorganisms may be possible, but application methods minimize adverse effects.

Toxicity to aquatic animals and plants is minimal. These results indicate that aquatic animals and plants are not at risk from reasonable exposure to boric acid.

Wasp Freeze (pyrethrin)

Targeted spray	Stinging insects
Targeted Spray products	
Wasp Freeze Prallethrin	
CAS No. 23031-36-9	
Cyclopropanecarboxylic acid, 2-methyl-4-oxo-3-(2-propynyl) cyclopent-2-enyl-cis, trans-chysanthemate.	
Aerosol, colorless, characteristic petroleum distillate odor	
Low toxicity to mammals, birds. Moderately toxic to fish and aquatic invertebrates	

Mode of Action

Pyrethroids affect insect neuroactivity by binding to a protein at the nerve fiber that regulates the voltage-gated sodium channel. This can delay the closing of sodium channels and/or cause a persistent activation of the sodium channels. This often results in repetitive activity (Type I pyrethroid) or blockage of nerve conduction (Type II pyrethroid).

Pyrethrins are contact poisons that can quickly penetrate the neural system. Pyrethrins act by causing a persistent activation of the sodium channels on insect neurons. Although pyrethrins have an effective “knockdown” action (induction of temporary paralysis), they do not necessarily have high killing properties when used alone. In order to delay the metabolic action (inhibition of microsomal enzymes) so that a lethal dose is assured, the synergist piperonyl butoxide (PBO) is added to mosquito adulticides (USEPA 2006).

Pyrethrins are natural organic compounds derived from the plant *Chrysanthemum cinerarifolium*. These compounds have been known for their insecticidal properties for many centuries, and it is believed the Chinese used the powder of crushed chrysanthemum plants as an insecticide as early as 1000 BCE (USEPA 2019). Pyrethrins affect the nervous system of insects causing paralysis and death. Pyrethrins are photo unstable, rapidly degrading in the presence of light.

Environmental Fate and Transport

Pyrethroid insecticides are synthetic compounds that are chemically similar to the pyrethrins but have been modified to increase stability and activity against insects. Some synthetic insecticides are similar to pyrethroids, such as etofenprox, but have a slightly different chemical composition. First generation or “Type I” photosensitive pyrethroids include d-allethrin, phenothrin (sumithrin), prallethrin, resmethrin, and tetramethrin. Typically, these pyrethroids are used indoors and around residential areas. The newer second-generation pyrethroids are mostly “Type II” pyrethroids. Chemically, Type II pyrethroids are distinguished from Type I pyrethroids by the presence of anα-cyano group in their structure. The active ingredients that fall into this group include deltamethrin, esfenvalerate, lambda-cyhalothrin, and permethrin. Type II pyrethroids are more toxic (than Type I pyrethroids) because they are less photosensitive and persist longer in the environment.

Pyrethrins are naturally occurring products distilled from the flowers of Chrysanthemum species. Pyrethrins were first registered in the U.S. for use as an insecticide in the 1950s, for wide-area mosquito abatement in areas that include aquatic habitats. They are also used on outdoor household areas, pastureland, aquatic area or standing water, and for hospitals, recreational areas, ULV applications, and mosquito abatement programs (USEPA 2006, CDPR 2019).

Human Toxicology

Pyrethrins and pyrethroids pose relatively little hazard to humans by natural routes of exposure at levels likely to be encountered in the environment or resulting from the normal use of pyrethrin- or pyrethroid-containing substances. Signs and symptoms of acute toxicity vary according to the type of pyrethroid to which one may be exposed. However, almost all systemic effects are related to the action of pyrethrins and pyrethroids on the nervous system. Neurological signs typically result from acute toxicity. Low level chronic exposures to pyrethrins and pyrethroids usually do not cause neurological signs in mammals, largely due to rapid metabolism and elimination. No reports that pyrethrins or pyrethroids significantly affect end points other than the nervous system, although changes in liver weight and metabolism of chemicals have sometimes been used as an index of adverse effect levels for pyrethroids. Results of a few recent animal studies suggest that neurodevelopmental, reproductive, and immunological effects may result following exposure to some pyrethroids at levels below those that induce overt signs of neurotoxicity. Available data indicate that pyrethrins may be a carcinogenic concern to humans. No human data are available regarding the potential for pyrethroids to cross the placental barrier and enter a developing fetus. Pyrethroid pesticides have a common mammalian mode of action: interaction with voltage-gated sodium channels (VGSCs) (USEPA, 2009). This interaction results in disruption of membrane excitability in the nervous system, leading to neurotoxicity.

Ecological Toxicity

Pyrethrins have low acute toxicity to mammals (oral LD50 Rats>5,000), and relatively nontoxic via inhalation (LC50 >2.08 mg/L), relatively non-toxic by dermal exposure. No evidence of skin sensitization, slight temporary irritation to eyes. As a directed anti-insect spray it is designed to be selectively nontoxic to other wildlife. Toxic to fish and other aquatic life with long lasting effects (LC50< 0.012 mg/l. salmon) and EC50 0.0062 mg/L for daphnia (USEPA 2006).

Table 6. Human Toxicity Summary of the Pesticides as Proposed for Use in the IPM Program

Active Ingredient	Mammalian Oral LD50 (mg/kg)[A]	Mammalian Dermal LD50 (mg/kg)[B]	Mammalian Inhalation LC50 (mg/L)[A]	USEPA Toxicity Rating	Carcinogenic to Humans?	Reproductive or Developmental toxicity	Neurotoxic	Immunotoxic	Endocrine Disruption
Glyphosate RoundUp RoundUp Pro	>4,320 (technical); ≥5,000 (salts)	≥2,000 (tech); ≥5,000 (salts)	≥4.43 (tech); >1.3 (salts)	Oral, dermal, inhalation (III)	Not likely	Not likely	Not likely	Not likely	In human cell lines at very high doses
Aminopyralid Milestone Capstone	>5,000	>5,000	>5.79	Oral, dermal, inhalation (IV)	Not likely	Not likely	Not likely	Not likely	Not likely
Triclopyr Capstone	>5,000	>5,000	>5.79	Oral, dermal, inhalation (IV)	Not likely	Not likely	Not likely	Not likely	Not likely
Clopyralid Transline	>5,000	>5,000	>3.0	Oral, dermal, inhalation (III)	Not likely (may contain hexachlorobenzene – potential human carcinogen)	Not likely	Not likely	Not likely	Not likely
Imazapyr Polaris	>5,000	>2,000	>1.3	Oral, dermal, inhalation (IV)	Not likely	Not likely	Not likely	Not likely	Not likely
Clethodim Envoy	>5,000	>5,000	>3.9	Oral, dermal, inhalation (IV)	Not likely (Envoy contains naphthalene – potential human carcinogen)	Not likely	Not likely	Not likely	NA
Chlorsulfuron Telar XP	LD50 (rat) 4,286mg/kg	>5,000	>5.9	Oral, dermal, inhalation (IV)NA	Not likely	Not likely	Not likely	Not likely	NA
Fluroxypyr 1-methylheptyl ester Vista	>5,000	>5,000	>5.5	Oral, dermal, inhalation (IV)NA	Not likely	Not likely	Not likely	Not likely	NA
Essential Oils Weed Zap	NA	NA	NA	Oral, dermal, inhalation (IV)	Not likely	Not likely	Not likely	Not likely	NA

Active Ingredient	Mammalian Oral LD50 (mg/kg)[A]	Mammalian Dermal LD50 (mg/kg)[B]	Mammalian Inhalation LC50 (mg/L)[A]	USEPA Toxicity Rating	Carcinogenic to Humans?	Reproductive or Developmental toxicity	Neurotoxic	Immunotoxic	Endocrine Disruption
Dithyopyr Dimension	>5,000	>5,000	>5.89	Oral, dermal, inhalation (IV)NA	Not likely	Not likely	Not likely	Not likely	NA
Isoxaben Gallery	>5,000	>5,000	>5.71	Oral, dermal, inhalation (IV)	Not likely	Not likely	Not likely	Not likely	NA
2,4-D Diethylamine	639 -1646	>2,000	>1.8	Oral, dermal, inhalation (III)	Not likely	Not likely	Not likely	Not likely	NA
Cholecalciferol	LD50 42 mg/kg (Rat)			Oral, dermal, inhalation (I)	Not likely	Not likely	Not likely	Not likely	NA
Pelargonic Acid Scythe	LD50 >5,000	LD50 >2,000	LC50 5.29	Oral, dermal, inhalation (IV, IIII)	Not likely	Not likely	Not likely	Not likely	NA
Pyrethrin Wasp Freeze	>5,000	>5,000	>2.08	Oral, dermal, inhalation (IV)NA	NA	NA	NA	NA	NA
Insecticidal Soap Garden Safe	NA	NA	NA	Oral, dermal, inhalation (IV)	Not likely	Not likely	Not likely	NA	NA
Indoxacarb Advion Gel	LD50 <1000 mg/kg (Rats)	LD50 > 5000 mg/kg (Rata)	5.5 mg/L	Oral, dermal, inhalation (II)	Not likely	Not likely	Not likely	Not likely	NA
Hydropene Gentrol	LD50 >5000 mg/kg (Rats)	LD50 > 5000 mg/kg (Rata)	NA	NA	Not likely	Not likely	Not likely	Not likely	NA
Fipronil MaxForce Bait	LD50 100 mg/kg (Rat)	>2000-5000 mg/kg (Rat)	NA	Oral, dermal, inhalation (III)	Not likely	Not likely	Not likely	Not likely	NA
Boric Acid	LD50 = 2660 mg/kg (Rat)	LD50 > 2000 mg/kg Rabbit	NA	Oral, dermal, inhalation (III)	Not likely	Not likely	Not likely	Not likely	NA
Diatomaceous Earth	NA	NA	NA	Oral, dermal, inhalation (IV)	Not likely	Not likely	Not likely	NA	NA

Source: Toxicity data are derived from respective sections in this document and summarized for the categories used by USEPA and other regulators based on the expected use by the Authority under the IPM Program . Some data represent the most likely values within the typical range of effects in the literature.

Summary

Each of the 22 pesticide chemicals or products proposed for use in the IPM Program were evaluated for toxicity and/or potential adverse environmental effects. The hazard information, exposure assumptions, and potential toxicity associated with the listed active ingredients have been addressed. This review suggests that minimal to no potential significant adverse impacts are expected from pesticide use proposed under the IPM Program. Use of these products within the label restrictions and regulatory guidance should not result in any significant adverse impacts to human health or the environment.

Overall, the proposed uses of pesticides under the IPM Program should provide adequate and safe margins because they will be used according to label guidance, existing laws and regulations, and in compliance with more restrictive environmental protection measures that are included in the IPM Program. Although the pesticides reviewed and the uses proposed are considered safe with minimal to no potential significant adverse impacts, reports in the media and recent litigation have raised public concerns that should be noted regarding glyphosate and 2,4-D. Most of these reports are not supported by defensible relevant studies and instead, the primary body of research suggests these products are safe to use when applied appropriately and in accordance with existing regulations.

Tables

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