MOSQUITO AND VECTOR MANAGEMENT DISTRICT
OF SANTA BARBARA COUNTY

AGENDA
SPECIAL MEETING
August 25, 2026 at 3:00 PM

Brownstein, Hyatt, Farber, Schreck, 1st Floor Meeting Room, 1020 State Street, Santa Barbara, CA 93101

President
Danica Taber, City of Goleta (through 1/1/28)
Vice President
Joseph Franken, City of Carpinteria (through 1/31/27)
Secretary
Russell Dahlquist, Santa Barbara County (through 12/31/26)
Trustee
Barbara Silver, Santa Barbara County (through 10/10/26)
Trustee
Robert Williams, Santa Barbara County (through 12/31/26)
Trustee
Dr. Teri Jory, City of Santa Barbara (through 1/4/27)
Trustee
Dr. Steven Gaulin, Santa Barbara County (through 12/31/27)

PARTICIPATION OPTIONS:

- **Attend in Person:** Attend in person at the Law Offices of Brownstein, Hyatt, Farber Schreck, 1020 State Street, 1st Floor meeting room, Santa Barbara, CA, 93101
- **Virtual Attendance:** Join the Zoom webinar by clicking on the following link: https://us02web.zoom.us/j/84932925956 (Meeting ID: 849 3292 5956; Passcode: 148661)
- **Attend Via Phone:** Dial in For Audio Only: 1- 669-900-6833 or 1-669-444-9171, (ID: 849 3292 5956#)

HOW TO PROVIDE PUBLIC COMMENT:

- **In Person:** Provide in-person public comment at the meeting (Law Offices of Brownstein, Hyatt, Farber Schreck, 1020 State Street, 1st Floor meeting room, Santa Barbara, CA, 93101).
- **On Zoom/Virtual:** Use the "raise your hand" feature to notify staff that you would like to make a public comment during designated public comment times. Once it is your turn to provide a public comment, staff will unmute your microphone and you will be given a designated amount of time to comment. At the end of your comment, staff will once again mute you.
- **Written Comment:** Submit a written comment by 8:00 AM on the day of the meeting (as either a general public comment or on a specific agenda item) by either submitting your comment via (1) email to info@mvmdistrict.org, or (2) in a writing mailed to the District, attention Board Secretary. Please reference the agenda item to which your comment pertains. Although written comments become part of the record, they will not be read aloud at the meeting.

Please note that the District will make every effort to make the meeting accessible virtually; however, if the above virtual attendance/viewing or public comment options is unavailable due to technological issues, you are invited to take advantage of one of the other participation options outlined above. Additional options may be made available at the meeting.

Any materials which are distributed less than 24 hours prior to this meeting to all, or a majority of all, Trustees in connection with any agenda item (other than closed sessions) will be available for public inspection at the time of such distribution at the District's office located at 2450 Lillie Avenue, Summerland, CA 93067. Such records may also be posted on the District's website at www.mvmdistrict.org

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1. **ROLL CALL**

2. **CONFIRMATION OF AGENDA**

3. **DISCUSSION/ACTION ITEMS**
   The Board will discuss and may take action on the following items.

   A. Receive and File and Open the Voluntary 30-Day Public Comment Period for the Special Coastal Procedures to the District's Integrated Mosquito Vector and Management Plan ("IMVMP"). *(Page 3) The administrative draft of the Special Coastal Procedures to the Integrated Mosquito and Vector Management Plan is now available for voluntary 30-day public review and comment. Kendra Wopat, biologist from Rincon Consultants, Inc. will give a presentation summarizing the key aspects of the Special Coastal Procedures*

4. **CLOSED SESSION PURSUANT TO GOVERNMENT CODE SECTION 54957**

   A. Public comment on closed session agenda items.

   B. Temporary adjournment to closed session.

   C. PUBLIC EMPLOYMENT – EVALUATION OF PERFORMANCE (Govt. Code section 54957)

      i. Title: District legal counsel

   D. Reconvene to open session for closed session report.

5. **ADJOURNMENT** (Next scheduled meeting: Thursday, September 10 at 1:00 PM.)

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Persons with disabilities who require any disability-related modification or accommodation, including auxiliary aids or services, in order to participate in the meeting are asked to contact the District's General Manager at least three (3) days prior to the meeting by telephone at (805) 969-5050 or by email at gm@mvmdistrict.org.

Mosquito and Vector Management District of Santa Barbara County

Administrative Draft Integrated Mosquito and Vector Management Plan Special Coastal Procedures

prepared for

Mosquito and Vector Management District of Santa Barbara County[1]
2450 Lillie Avenue
Summerland, California 93067
Contact: General Manager

prepared by

Rincon Consultants, Inc.
319 East Carrillo Street, Suite 105
Santa Barbara, California 93101

and

Tidal Influence
2539 East 7th Street
Long Beach, California 90804

August 2026

[1] This document was prepared at the direction of District counsel, Brownstein Hyatt Farber Schreck, LLP.

RINCON CONSULTANTS

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List of Acronyms and Abbreviations

Abbreviation	Term/Phrase/Name
BMP	Best Management Practice
BSS	Belding's Savannah sparrow (*Passerculus sandwichensis beldingi)*, State Endangered
Bs	*Bacillus sphaericus* (mosquito larvicide bacterium)
Bti	*Bacillus thuringiensis israelensis* (mosquito larvicide bacterium)
CCBER	Cheadle Center for Biodiversity and Ecological Restoration
CCA	California Coastal Act
CCC	California Coastal Commission
CDFW	California Department of Fish and Wildlife
CDP	Coastal Development Permit
CDPH	California Department of Public Health
CDPR	California Department of Pesticide Regulation
CESA	California Endangered Species Act
CEQA	California Environmental Quality Act
CFGC	California Fish and Game Code
CNDDB	California Natural Diversity Database
CNPS	California Native Plant Society
CRPR	California Rare Plant Rank
ESA	Endangered Species Act
ESHA	Environmentally Sensitive Habitat Area
FE	Federal Endangered
FP	State Fully Protected
FPT	Federally Proposed Threatened
FT	Federally Threatened
GP/CLUP	City of Goleta General Plan/Coastal Land Use Plan
GSD	Goleta Sanitary District
GSEMP	Goleta Slough Ecosystem Management Plan
GSMC	Goleta Slough Management Committee
GWSD	Goleta West Sanitary District
H&S Code	California Health and Safety Code
IMM	Integrated Mosquito Management
IPM	Integrated Pest Management
IMVMP/Plan	Integrated Mosquito and Vector Management Plan
LCP	Local Coastal Program
MBTA	Migratory Bird Treaty Act
MVCAC	Mosquito and Vector Control Association of California
NAVD	North American Vertical Datum
NMFS	National Marine Fisheries Service

Abbreviation	Term/Phrase/Name
NPDES	National Pollutant Discharge Elimination System
NWI	National Wetlands Inventory
PAP	Pesticide Application Plan
PHAER	Pesticide Hazard And Exposure Reduction
PVC	polyvinyl chloride
RWQCB	Regional Water Quality Control Board
SBA	Santa Barbara Airport
SBAS	Santa Barbara Audubon Society
SBBG	Santa Barbara Botanical Garden
The “County”	The County of Santa Barbara
SBCFCD	Santa Barbara County Flood Control District
SE	State Endangered
SoCalGas	Southern California Gas Company
SCP	Special Coastal Procedures
SSC	Species of Special Concern (CDFW)
SWPT	Southwestern pond turtle (*Actinemys pallida*), Federal Proposed Threatened/SSC
SWRCB	State Water Resources Control Board
TWG	Tidewater goby (*Eucyclogobius newberryi*), FE
UCSB	University of California, Santa Barbara
USACE	United States Army Corps of Engineers
USEPA	United States Environmental Protection Agency
USGS	United States Geological Survey
USFWS	United States Fish and Wildlife Service
VBDS	Vector-Borne Disease Section
WNV	West Nile virus

Mosquitoes and Larvicide-Related Species

Common Name/Term	Scientific Name
yellow fever mosquito	*Aedes aegypti*
Asian tiger mosquito	*Aedes albopictus*
Australian backyard mosquito	*Aedes notoscriptus*
California salt marsh mosquito	*Aedes squamiger*
black salt marsh mosquito	*Aedes taeniorhynchus*
floodwater mosquito	*Aedes washinoi*
Franciscan malaria mosquito	*Anopheles franciscanus*
western malaria mosquito	*Anopheles freeborni*
coastal malaria mosquito	*Anopheles hermsi*
No widely standardized common name	*Anopheles occidentalis*
woodland malaria mosquito	*Anopheles punctipennis*
tule mosquito	*Culex erythrothorax*

Common Name/Term	Scientific Name
No widely standardized common name	*Culiseta particeps*
southern house mosquito	*Culex quinquefasciatus*
banded foul water mosquito	*Culex stigmatosoma*
western encephalitis mosquito	*Culex tarsalis*
cool weather mosquito	*Culiseta incidens*
winter mosquito / large winter mosquito	*Culiseta inornata*
No widely standardized common name	*Culiseta particeps*
Bti/Mosquito larvicide bacterium	*Bacillus thuringiensis israelensis*
Bs/Mosquito larvicide bacterium	*Bacillus sphaericus*
spinosad-producing soil bacterium	*Saccharopolyspora spinosa*
mosquito fish	*Gambusia affinis*

Note that this document covers only the Special Coastal Procedures and countywide BMPs for voluntary public review. These sections may be reformatted, reorganized, or revised when incorporated into the countywide IMVMP. This document may also include notes to the public providing explanatory context for certain sections and what to expect in the overall IMVMP.

1 Introduction

The Mosquito and Vector Management District of Santa Barbara County (District) proposes a Countywide comprehensive Integrated Mosquito and Vector Management Plan (IMVMP or Plan), including the Special Coastal Procedures Section specific to sensitive areas in the coastal zone. The IMVMP will serve as a single reference document consolidating all District activities (including, but not limited to, surveillance, control methods, public education, environmental compliance, and emergency response) into one coordinated framework. The Plan is intended to give both the public and decision-makers a clear understanding of current practices, anticipated needs, District proposed Best Management Practices (BMPs) to implement in the future and the District's long-term strategy for protecting public health, while safeguarding the environment. This effort is intended to strengthen legal resilience, ensure regulatory compliance, and advance the District's mission to protect public health, safety, and welfare.

The IMVMP formalizes these practices to ensure continued compliance with public health mandates, environmental regulations, and evolving best practices. The IMVMP also establishes enforceable countywide BMPs and Special Coastal Procedures (SCPs) that avoid or minimize impacts to Environmentally Sensitive Habitat Area (ESHA), special-status species, and sensitive wetlands. This Special Coastal Procedures Section has been drafted using information obtained through pest management data collection, on-site observations, personnel interviews, and document reviews.

The Section will be incorporated into the IMVMP and undergo environmental review.

1.1 District and Integrated Mosquito and Vector Management Plan Background

The purpose of the District is to conduct surveillance, prevention, abatement, and control programs for mosquitoes and other vectors pursuant to its statutory authority under the California Health and Safety Code (H&S Code) to protect public health, safety, and welfare. The District directly interfaces with governments, special districts, homeowners' associations, and individual citizens to assist them in addressing their vector-related problems. The District provides mosquito abatement, rodent inspection and rodent mitigation advice, honeybee response, and yellow jacket control. It also routinely monitors the environment for vector-borne diseases, such as West Nile virus (WNV), Western Equine, and St. Louis Encephalitis viruses, as well as other public health threats. A structured planning process will enhance transparency for the community and provide a clear framework for prioritizing resources, evaluating outcomes, and guiding future activities in compliance with regulations. This comprehensive review of the District's services is to ensure programs remain effective, science-based, environmentally responsible, and responsive to evolving public health needs and regulatory requirements.

The IMVMP is based on Integrated Mosquito Management (IMM) principles established and implemented by the California Department of Public Health (CDPH), California Department of Pesticide Regulation (CDPR), and over 50 local Mosquito and Vector Control Districts in California under the Mosquito and Vector Control Association of California (MVCAC). IMM is a science-based, multi-component public health approach used by mosquito and vector control districts to prevent and manage mosquito populations while minimizing risks to human health, wildlife, and the environment. IMM emphasizes surveillance-based decision-making, larval source management, biological controls, least-toxic chemical tools, and continuous evaluation to minimize impacts to non-target organisms and sensitive habitats. The use of multiple tools and strategies is essential, as no single method is sufficient to manage vector populations across diverse environmental settings (MVCAC 2020). MVCAC statewide guidance is included under Appendix A. The District specific IMM is further discussed in Section 2.

1.2 Special Coastal Procedures Purpose and Need

Wetlands present a dual challenge: they are ecologically sensitive environments and highly productive mosquito habitats. Seasonal flooding, freshwater impoundment, stagnant water sources, and decreased water flow and drainage can generate large populations of mosquitoes, including species that serve as vectors of human disease.

The District addresses this challenge through targeted, ecologically conscious practices that have evolved through collaboration with regulatory agencies and land managers. By focusing on larval control (instead of broad pesticide use targeting adult mosquitoes), using biological agents, and employing trained biologists to oversee operations, the District has succeeded in controlling mosquitoes without significant harm to non-target species or habitats. This integrated approach is formalized within this Special Coastal Procedures Section of the IMVMP to ensure that coastal mosquito abatement activities remain transparent, science-based, and in compliance with applicable regulations.

1.3 Mosquito Life Cycle

Although few environmental benefits have been documented for mosquitoes, their harms are well-known. Most female mosquitoes feed on the blood of one or more species to fuel egg development. Many take repeated blood meals, enabling them to vector pathogens between animals, including humans. This promotes epidemics and epizootics of various diseases caused by viruses, protists, nematodes, and other pathogens, causing morbidity and mortality in humans, domestic animals, and wildlife. Examples include viruses that can cause encephalitis in humans, horses, birds and other animals, protists that cause avian and human malaria, and nematodes that cause diseases of the cardiac and lymphatic systems in wildlife and humans (Lawler 2017).

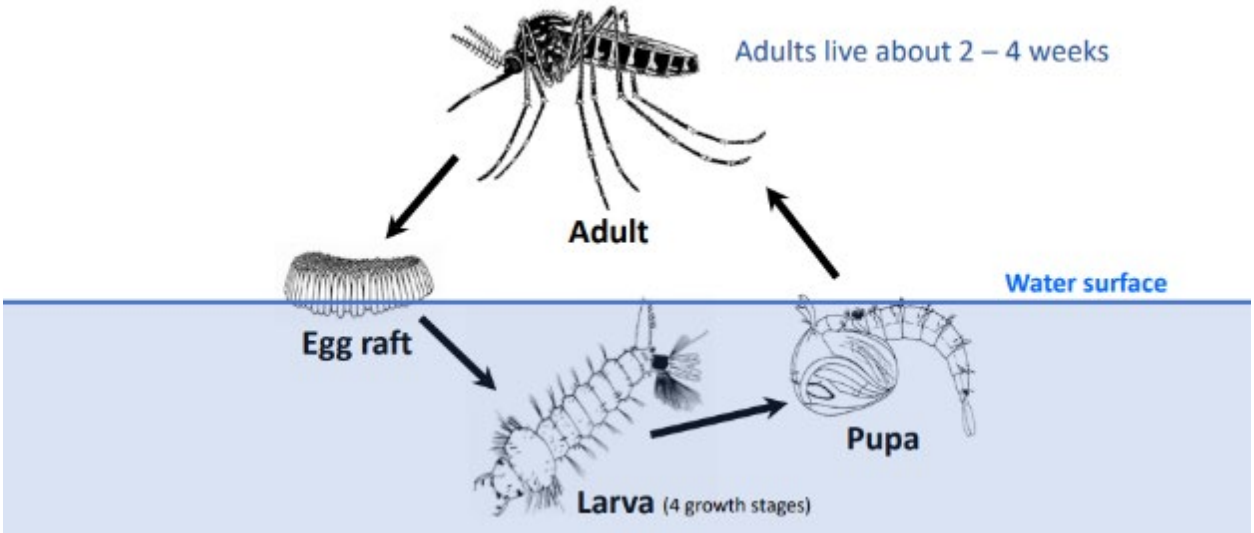
Mosquitoes have four life stages: egg, larva, pupa, and adult. Immature mosquito stages need standing water to complete their life cycle. Females lay their eggs singly or in clusters (called rafts), depending on the species. The eggs float on the surface of still or slow-moving water and hatch into larvae within a few days. The larval stage is also aquatic and includes four growth stages called instars, during which larvae feed on organic matter and microorganisms and molt between each instar stage as they grow. After the fourth instar, the mosquito enters the pupal stage, a non-feeding but active phase. Finally, the adult mosquito emerges from the pupa, where it can feed, mate, and continue the life cycle. Adults typically live about two to four weeks. Under ideal conditions, such as warm temperatures and abundant water sources, mosquitoes can develop from egg to adult in seven days (District 2026). Figure 1 shows an example of a mosquito life cycle.[2]

Fifty-two species of mosquitoes occur in California, and more specifically, approximately 26 species of mosquitoes occur in Santa Barbara County (also referred to as the “County”). Of these 26 species, seven are most common:

- Disease vectors: western encephalitis mosquito (*Culex tarsalis*), southern house mosquito (*Culex quinquefasciatus*), coastal malaria mosquito (*Anopheles hermsi*), and winter mosquito (*Culiseta inornata*), and tule mosquito (*Culex erythrothorax*)
- Nuisance species: black salt marsh mosquito (*Aedes taeniorhynchus*) and floodwater mosquito (*Aedes washinoi*) are notoriously aggressive day-biters that swarm humans but are not primary disease vectors. The southern house, tule, and winter mosquitoes are aggressive biters in addition to carrying viruses.

[2] Figure 1 illustrates one example of a mosquito life cycle and is provided for informational purposes only, as breeding specifics may vary among mosquito species (Mullen and Durden 2009).

Figure 1 Mosquito Life Cycle



Source: District 2026

Mosquito-Borne Illness

Hot weather accelerates the life cycle of mosquitoes so that mosquito larvae become adults much faster, which can lead to an increase in the abundance of adult mosquitoes in an area. An increase in the abundance of mosquitoes that are potential vectors for disease can increase the public's risk of contracting diseases.

WNV is a disease of concern for the District and is primarily vectored by the *Culex* species. WNV becomes most actively vectored during the hotter months of the year. The reservoir for WNV is wild birds, which are in great abundance in and around the County's wetlands (e.g., Goleta Slough). Female encephalitis mosquitoes are the major vector of WNV and St. Louis Encephalitis. They readily feed on birds, as well as mammals, including humans. The presence of numerous wild birds and large populations of *Culex* mosquitoes near humans, plus hot summer weather, combine to create situations in which there is a higher risk of WNV transmission.

Invasive Vectors and Nuisance Mosquitoes

Two invasive (non-native) mosquito species, yellow fever mosquito (*Aedes aegypti*) and Asian tiger mosquito (*Aedes albopictus*) that can carry and transmit Zika, Dengue, Chikungunya, and yellow fever viruses to humans, have spread to numerous California cities and there is the potential for them to become established in the County. The District deploys specially designed traps at various locations to monitor for the presence of yellow fever mosquito and Asian tiger mosquito.

Several specimens of adult Australian backyard mosquito (*Aedes notoscriptus*), a non-native, aggressive daytime-biting mosquito, were found in March 2026 in a sample from a residence in the Westside neighborhood of Santa Barbara (District 2026). In Australia, this species is a primary vector of dog heartworm.

1.4 Vector Regulation Summary

The CDPH's Vector-Borne Disease Section (VBDS) protects the health and well-being of Californians from diseases transmitted to people from insects and other animals. VBDS conducts prevention, surveillance, and control of WNV, Lyme disease, plague, hantavirus, and other vector-borne diseases throughout California. CDPH's VBDS declares statewide alert levels, provides testing and epidemiological analysis, issues public health advisories, and can deploy state resources (stockpiled pesticides, technical experts,

mobile labs). CDPH also coordinates with the Centers for Disease Control and Prevention if federal assistance is needed.

The County Health Officer is the legal authority for declaring local health emergencies and issuing health orders (e.g., mandatory mosquito abatement on private property). The department coordinates all local agencies, manages public communication, investigates human cases, and authorizes emergency vector control actions.

Aside from the District's regulatory authority to monitor and control vectors, individual activities are subject to applicable federal, state, and local environmental regulations, such as the federal and California Endangered Species Act, Migratory Bird Treaty Act, Clean Water Act and Rivers and Harbors Act, Statewide General National Pollutant Discharge Elimination System (NPDES) Permit for Vector Control, California Fish and Game Code, Porter-Cologne Water Quality Control Act, and others. Refer to IMVMP Appendix C Attachment C.2, Natural Resource Regulatory Setting, for details. *(Public review note: Appendix C, Attachment C.2 will be included in the Final Plan).*

State Water Resources Control Board NPDES Vector Control Permit

Under the requirements of the Porter-Cologne Act and the federal Clean Water Act, the State Water Resources Control Board (SWRCB) is delegated authority for the protection of surface and groundwater and issues a General NPDES Permit for vector control discharges under CWA Section 402. The District's NPDES permit (Order 2016-0039-DWQ, General Permit No. 990004) is part of Porter-Cologne Act compliance. The District is enrolled as a Coalition Member of the Statewide NPDES which authorizes use of specific larvicides (e.g., those containing *Bacillus thuringiensis israelensis* [Bti], *B. sphaericus* [Bs], spinosad, methoprene, oils) in wetlands provided strict monitoring and reporting conditions are met. The District submits annual reports to the SWRCB regarding pesticide use in compliance with General Permit No. 990004. The District's Pesticide Application Plan (PAP) (Appendix B) specifies the use and discharge of biological and residual pesticides, including larvicides and adulticides within federal Waters of the United States.

In the County, larvicide applications must meet the Water Quality Control Plan for the Central Coastal Basin Plan standards (e.g., for toxicity or residues in water) (Regional Water Quality Control Board [RWQCB] 2024). In 2014 state regulators significantly relaxed monitoring requirements after determining that mosquito larvicide use had no significant effect on water quality or beneficial uses in treated waters (SWRCB 2014).

Federal Insecticide, Fungicide, and Rodenticide Act

The Federal Insecticide, Fungicide, and Rodenticide Act Governs pesticide registration, labelling, and use. All larvicides used (Bti, Bs, methoprene, spinosad, etc.) must be United States Environmental Protection Agency (USEPA) registered and applied strictly according to USEPA-approved label instructions that prevent "unreasonable adverse effects" on people or the environment. The USEPA evaluates extensive toxicity data to ensure that when pesticides are used as directed, they will not pose significant harm to non-target species or ecosystems. Under the Federal Insecticide, Fungicide, and Rodenticide Act, only certified vector control technicians may apply restricted-use pesticides, and inert ingredients are also assessed as part of product formulations.

California Health and Safety Code Sections 2000–2093

These sections explicitly mandate that mosquito and vector control districts are authorized to identify and abate public nuisances, including mosquito outbreaks, and to take necessary action to protect public health. District actions such as surveillance, treatment, and elimination of breeding sites are not just permitted—they are mandated actions identified by the California legislature in controlling vector threats and safeguarding community well-being (H&S Code Section 2001[c]). As such, once a public nuisance is confirmed, the District has a mandatory duty to abate the nuisance (H&S Code Sections 2040–41, 2060).

California Department of Public Health

The District's pesticide use, including the registration and continuing education of state-certified field personnel, is reviewed and approved by the CDPH through a formal Cooperative Agreement that is reviewed and renewed annually (CDPH and District 2025).

California Pesticide Regulatory Program

CDPR regulates the sale and use of pesticides with oversight by every county's Agricultural Commissioner's Office. CDPR is responsible for reviewing the toxic effects of pesticide formulations and determining whether a pesticide is suitable for use in California through a rigorous registration process. For example, product labels may contain such measures as restrictions for applications on certain land and water uses and under certain weather (i.e., rain, wind speed) parameters.

All larvicides must be registered in California, and vector control agencies operate under a Cooperative Agreement with CDPH. Technicians are state certified by CDPH. The District submits monthly pesticide use reports to the County Agricultural Commissioner's Office, and these uses are tracked. In addition to the user's reliance on the label instructions to protect non-target species, pesticide risks to endangered species within California are evaluated by an interagency network that includes CDPR, the California Department of Fish and Wildlife (CDFW) Pesticide Investigation Unit, California Department of Food and Agriculture, the Pesticide Registration and Evaluation Committee, and County Agricultural Commissioners, as well as the USEPA and United State Fish and Wildlife Service (USFWS).

County Agricultural Commissioner

The County Agricultural Commissioner regulates the sale and use of pesticides and issues use permits for applications of pesticides that are deemed as restricted materials by CDPR. The County Agricultural Commissioner collects pesticide use reports from the District and other users. The County Agricultural Commissioner also investigates incidents, illnesses, complaints, and conducts annual inspections of pesticide users.

Integrated Public Health Response System

In the event of a public health emergency, the County of Santa Barbara Public Health Department and CDPH function as a coordinated two-tier response system:

- CDPH provides the scientific backbone: laboratory testing, statewide surveillance data, technical guidelines, and resource support.
- County Public Health provides local command: disease investigation, public communication, emergency declarations, and coordination with District.

The District provides operational capacity: the boots-on-the-ground mosquito and vector control expertise and infrastructure in addition to educating the public on these issues.

1.5 Aquatic Mosquito Habitats

The National Wetland Inventory[3] (NWI; USFWS 2026) maps wetland habitats throughout the United States, including those in the District's Enhanced Service Area (refer to Figure 2 and Figure 3). While any area that holds water for more than 96 hours (four days) can produce mosquitoes (CDPH 2023), the NWI maps illustrate locations of the largest sites in the Enhanced Service Area that may require treatment. Table 1 lists each of the wetland habitat types mapped in the Enhanced Service Area, along with representative locations, habitat descriptions, and potential for nuisance and vector mosquitoes.

[3] Deepwater tidal and freshwater creeks are excluded since only standing water receives treatment.

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Figure 2 Santa Barbara County Western Enhanced Service Area Mosquito Habitat and Coastal ESHA

Imagery provided by Esri and its licensors © 2026. Map created by Rincon Consultants, Inc., 2026.
Additional sources provided by USGS, 2025

Figure 3 Santa Barbara County Eastern Enhanced Service Area and Mosquito Habitat and Coastal ESHA

Imagery provided by Esri and its licensors © 2026. Map created by Rincon Consultants, Inc., 2026.
Additional sources provided by USGS, 2025

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County Coastal ESHA Page 2

Table 1 National Wetland Inventory Classification and Mosquito Habitat

Habitat/NWI Classification[1]	General and Mosquito Habitat Description	Example(s)	Nuisance Species	Vector Species
Brackish marsh, tidal marsh and channels, coastal salt marsh NWI: Estuarine and Marine Wetlands	Vegetated wetland area subject to tidal action. Includes both salt and brackish marshes. Includes tidal channels that carry water into and away from the marsh during the tidal cycle. In California coastal wetlands and estuaries, seasonal mosquito dynamics are driven less by temperature alone and more by hydrology, salinity, and tidal influence. Winter conditions are characterized by tidal flushing and cool temperatures that suppress mosquito breeding, whereas potential mosquito production is limited to localized, shallow, poorly flushed habitats during warmer summer months, with fully tidal areas remaining non-producing year-round. During winter, mosquito populations in estuarine wetlands are dormant or suppressed. Dormant eggs laid in fall do not hatch until warmer, stable conditions return.	Santa Barbara Airport (SBA): Basins A-M, Devereux Slough, Carpinteria Salt Marsh	California salt marsh mosquito (*Aedes squamiger*) black salt marsh mosquito (*Aedes taeniorhynchus*) cool weather mosquito (*Culiseta incidens*)	western encephalitis mosquito (*Culex tarsalis*)
Lagoon NWI Estuarine and Marine Deep Water	Area behind the mouth of a river or stream that has been closed off by sand or other material, but is at least sporadically subject to tidal action.	Andrée Clark Bird Refuge, Goleta Slough seasonally	cool weather mosquito tule mosquito (*Culex erythrothorax)* winter mosquito (*Culiseta inornata)*	western encephalitis mosquito
Riparian Corridor NWI Freshwater Forested/Shrub Wetland	The trees, shrubs and other vegetation that grow along the edges of creeks and rivers. Mosquito control activities within creeks focus on areas of slow-moving or isolated water, including side channels and pools that become disconnected from flowing water, residual puddles that persist as streamflows recede, dense emergent vegetation such as tule stands, and plunge pools associated with culverts, fish ladders, and other structures.	Atascadero, Tecolote, Old San Jose Creek, and San Pedro Creek	floodwater mosquito (*Aedes washinoi*) Franciscan malaria mosquito *(Anopheles franciscanus)* *Anopheles occidentalis* woodland malaria mosquito *(Anopheles punctipennis)*	
Freshwater Marsh NWI: Freshwater Emergent Wetland	Freshwater areas that support reeds, rushes, and other vegetation typical of wetlands.	SBA Tule Pond (Area J), Storke Wetland, Area R, Hollister sources (Area S)	floodwater mosquito tule mosquito	western malaria mosquito *(Anopheles freeborni)* western encephalitis mosquito coastal malaria mosquito (*Anopheles hermsi*)
Seasonal Wetlands/Marsh NWI: Freshwater Emergent Wetland	Areas that support standing water for part of the year, but dry out during the summer months.	Duck Pond (Basin K), SBA Basins I,R, L, and M	floodwater mosquito California salt marsh mosquito cool weather mosquito	western encephalitis mosquito southern house mosquito (*Culex quinquefasciatus*)
Vernal Pools NWI: Freshwater Emergent Wetland	Areas that support standing water for part of the year, but dry out during the summer months. Typically exhibit less water depth and wetted duration than seasonal wetlands/marsh.	More Mesa, Del Sol Vernal Pool Preserve	California salt marsh mosquito floodwater mosquito *Culex* spp. *Culiseta* spp.	
Water and Wastewater Management Facilities NWI Freshwater Pond	Constructed channels, ponds and other facilities designed for the management of water or wastewater. Includes flood control channels, agricultural and roadside ditches, stormwater retention basins, treatment ponds, waste ponds, wastewater treatment facilities, septic systems, and all associated facilities.	Goleta Sanitary District	cool weather mosquito *Culiseta particeps* tule mosquito	western encephalitis mosquito banded foul water mosquito *(Culex stigmatosoma)*
Ponds and Lakes	May include natural or artificial bottoms.	Parker Wetlands, Lake Los Carneros	floodwater mosquito	western encephalitis mosquito southern house mosquito tule mosquito Coastal malaria mosquito
Other. Agricultural areas, storm drains, urban Interface and infrastructure	Ditches, irrigated areas, urban run-off and sources such as buckets or tires, providing a variety of mosquito habitat sources.	Patterson agricultural block	Franciscan malaria mosquito	western encephalitis mosquito southern house mosquito banded foul water mosquito

NWI = National Wetland Inventory; SBA = Santa Barbara Airport

Source: California Department of Public Health, *Best Management Practices for Mosquito Control in California*, 2023, Appendix C: Typical Larval Habitats of California Mosquitoes, National Wetland Inventory (USFWS 2026)

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2 Integrated Mosquito Management Program

The District relies on surveillance, biological controls, and biological larvicides to manage mosquito populations. Physical habitat alteration, mechanized vegetation removal,[4] hydrological modification, and routine adulticide applications are not proposed. Surveillance data, including trap and sample counts, species composition, developmental stage, habitat conditions, and disease risk, guide all management decisions.

Surveillance, larvicide treatments, and biological controls are the main methods used by the District to control mosquito populations as guided by IMM[5] principles under CDPH's 2023 *Best Management Practices for Mosquito Control in California*. All treatment materials are applied by trained and certified technicians, and larvicides are applied only according to product label directions. Technicians must have Public Health Vector Control Technician certification from CDPH, which is maintained through continued education (MVCAC 2026).

Materials used to target the mosquito larval stage are used in strict accordance with the product's label directions. Products are formulated as granular pellets, tablets, or briquettes and are applied in dry form. The District employs various treatment methods and larvicides based on factors such as the mosquito species, the development stages of the larvae present, habitat conditions, presence or absence of water, and costs. The materials used are considered a safer alternative to conventional insecticides, which may have greater impacts on a broader range of non-target organisms, as discussed further below.

2.1 Surveillance

Surveillance operations are essential to determine the species present, the population level involved, and the potential risk of disease transmission. Surveys also serve as a valuable tool in evaluating control operations. Mosquito surveillance includes conducting both larval and adult surveys. Larval surveys are important because they determine where mosquitoes are breeding and what life cycle stage they are in, providing the information necessary to manage or eliminate mosquitoes at the source. Larval surveys involve visits to documented and suspected breeding sites that are inspected periodically throughout the mosquito season. Water samples are collected using a dipper, which is a handheld dip stick with a small sample cup attached at the end. The dipper allows field technicians to easily check water for the presence and abundance of larvae. In areas where mosquito control is conducted, random larval sampling is performed to check the effectiveness of treatments. In naturally occurring habitats, breeding sites are reached through established access points and foot paths or the least impactful/less sloped route, as feasible.

Adult mosquito surveys are conducted by collecting mosquitoes using traps. The District uses the BG-Sentinel mosquito trap (Appendix C Attachment C.1, Photograph 15) to conduct surveillance for invasive, non-native yellow fever mosquitoes and Asian tiger mosquitoes that are established in many California counties. These mosquitoes can carry and transmit Zika, Dengue, Chikungunya, and yellow fever viruses to humans. These non-native mosquitoes are aggressive daytime biters and live in close association with humans. Therefore, BG-Sentinel mosquito traps are placed in urbanized settings rather than near the wetland habitats that most native mosquito species prefer. BG-Sentinel traps require electricity from an outlet or an automotive battery and are baited with lures containing compounds found on human skin.

In natural areas, the District uses solid carbon dioxide (dry ice) baited Encephalitis Virus Surveillance traps to monitor native mosquito populations that can carry WNV, but may occasionally use them to

[4] Mechanical refers to ground disturbance affecting root systems (e.g., grubbing). Minor trimming of shrubs, small branches, or fallen tree limbs for access may be completed using hand tools for access.

[5] Term used under the CDPH's 2023 *Best Management Practices for Mosquito Control in California*. Also referred to as Integrated Vector Management, or Integrated Pest Management

monitor for invasive *Aedes* species as well (District 2026). A small battery-powered fan sits below the dry ice source. When a mosquito follows the scent plume and approaches the trap, the fan creates a gentle downdraft, sucking the mosquito into a fine mesh collection net. These traps are typically placed at ecological margins such as tree lines or dense vegetation about 3 to 5 feet off the ground, and are often left out overnight to capture peak mosquito activity periods. Carbon dioxide-baited traps can be set up in ESHA trees and large shrubs by technicians on foot without equipment without affecting vegetation (Appendix C Attachment C.1, Photograph 16).

2.2 Biochemical Controls

Each fall, applications of extended-release larvicide briquettes are scheduled for low-lying areas prone to flooding during the winter months. These “pre-treatments” are conducted before the depressions are flooded by precipitation events. Pre-treatments are preferred for larger basins that experience seasonal wet/dry cycles from rain events, especially where subsequent emergent vegetation growth hinders effective placement of post-flooding larvicides. Flooding activates pre-applied larvicides upon wetting and provides immediate control of hatching mosquito larvae. Pre-treatments eliminate the need for technicians to enter the area again for upward of 180 days due to the briquettes’ extended-release formulation. Pre-treatment larvicides can also be used after a site is flooded to extend the effectiveness of treatments. Table 2 shows the various product options for pre- and post-mosquito larvae treatment and is further discussed below.

Larvicide Deployment

All larvicides are deployed by District technicians with a battery-powered backpack and gas-powered applicators. The battery-powered applicators are the preferred choice, but gas-powered applicators are used when needed. Larvicide is currently deployed without the use of vehicles or ground disturbance, as discussed below:

- **Granules.** One of the most common methods of biological control involves the use of a horn seeder to apply Bti or Bs granules (or VectoBac granules). The horn seeder consists of a vinyl shoulder bag worn by the field technician to hold the granules, with an attached polyvinyl chloride (PVC) pipe used to disperse the material (Appendix C, Attachment C.1, Photograph 6). This method allows technicians to manually apply granules on foot, typically in easily accessible areas, with an effective dispersal range of approximately 15 to 25 feet from the technician depending on wind direction. Field technicians must periodically refill bags with granules. The horn seeder has no mechanical components and relies entirely on manual operation. Another method for deploying VectoBac granules involves the use of a backpack-mounted mechanical applicator, worn by the field technician, which can hold a larger volume and disperse granules over a greater distance than a horn seeder.

Briquettes. Briquette treatments involve deploying briquettes by hand from a bucket (Appendix C Attachment C.1, Photograph 3). Field technicians carry buckets filled with briquettes and walk along established transects, placing briquettes approximately every 10 feet. Briquettes are applied in both wet and dry areas, as appropriate. Once a bucket is empty, technicians return to reload and then resume application along the transects. In addition to hand placement, briquettes may be deployed using a slingshot or a long PVC pipe (approximately 6 to 7 feet in length), referred to as a DC jab pipe. Using the PVC pipe method, two to three briquettes are placed at the end of the pipe and tossed into the treatment area, allowing for more efficient placement. The PVC pipe or slingshot deployment methods are most effective in areas with dense vegetation and limited or no foot access (e.g., thick cattail or tule ponds). Deployment involves no heavy equipment and relies entirely on manual operation or a gasoline or battery-powered backpack applicator.

Larvicide Products

The District uses several brands of biologically based control agents to perform both pre- and post-treatments. These larvicides specifically target each mosquito species' aquatic larval stage. While details vary among the larvicide products used, the District's current PAP (Appendix B) is provided as an example of criteria considered by vector control staff prior to every mosquito chemical control treatment.

The following larvicide active ingredients are used by the District:

- **Methoprene**. Altosid is one of the biochemical based brands that is used by the District, and methoprene is the active ingredient in this product. Methoprene is a hormone-based insect growth regulator that is commonly used to control a variety of arthropod pests. So as not to impact marine invertebrates, products containing methoprene are not proposed to be used in tidal wetlands during typical surveillance and treatment activities.
- **Spinosad.** Natular is a brand used as an alternative to Altosid which can be used in marine settings. The active ingredient in Natular is a naturally derived insecticide produced by the fermentation of the soil bacterium *Saccharopolyspora spinosa* that is not toxic to mammals and is not carcinogenic, genotoxic, or a reproductive or developmental toxin. Natular products come in a variety of forms and the tablet form is the best alternative to Altosid. Natular is organic as verified by the Organic Materials Review Institute.
- **Bti and Bs**. VectoBac and Fourstar products are also an alternative to larvicides containing methoprene and contain the bacteria *Bacillus thuringiensis israelensis* (Bti) and *Bacillus sphaericus* (Bs) which act as larvicides. Fourstar is more effective in shallower water, whereas VectoBac is more effective for short term control in water depths greater than 2 feet. Both are used for post-treatment (after flooding). Post-treatment applications of products containing Bti or Bs are useful for quick suppression of mosquito larvae populations in the water.

Pesticides used in California must be registered with CDPR. CPDR maintains an extensive registered products database, including label information, active ingredients, and registration status (CDPR 2026). Mosquito control products can be differentiated based on their selectivity, environmental fate, and potential for non-target impacts. The color ranking under Table 2 is from the City of Santa Barbara's Pesticide Hazard and Exposure Reduction (PHAER)[6] zone model updated Tiered Materials List, which divides approved mosquito control products into three color categories (green, yellow, red). This risk-based IPM decision framework prioritizes the least-toxic and most target-specific mosquito control products (green-ranking products) while reserving higher-risk pesticides for situations where lower-risk alternatives are ineffective (yellow and red-ranking products). The ranking system classifies methoprene-based products as yellow, while bacterial larvicides based on Bti and Bs are ranked green (City of Santa Barbara 2023, 2006).

[6] A PHAER-based Tiered Materials List is a pesticide ranking system that allows applicators to clearly and simply evaluate the short and long term hazards of a material (City of Santa Barbara 2006).

Table 2 Product Options for Pre- and Post-Mosquito Larvae Treatments[1]

Product	Active Ingredient	EPA Regulation Number	Signal Word	Selectivity, Coastal limitations
Pre-Mosquito Larvae Treatments				
Altosid Briquettes	methoprene	2724-375	caution	Insect-hormone pathway, no tidal marsh use
Altosid Pellets	methoprene	2724-448	caution	Insect-hormone pathway, no tidal marsh use
Altosid XR	methoprene	2724-421	caution	Insect-hormone pathway, no tidal marsh use
Altosid P35	methoprene	8945 9-95	caution	Insect-hormone pathway, no tidal marsh use
Fourstar Briquettes	Bti and Bs	83362-3	caution	Highly selective, approved tidal marsh use
Fourstar CRG Granules	Bti and Bs	85685-4	caution	Highly selective. approved tidal marsh use
Natular T30	spinosad	8329-85	caution	Short persistence, limited, site-specific
Natular XRT	spinosad	8329-84	caution	Short persistence, limited, site-specific
Post-Mosquito Larvae Treatments				
VectoBac G	Bti	73049-10	caution	Highly mosquito-specific, approved tidal marsh use
VectoLex FG	Bs	73049-20	caution	Highly mosquito-specific, approved tidal use
VectoMax WSP	Bs	73049-429	caution	Highly mosquito-specific, approved tidal use

Bs = *Bacillus sphaericus*; Bti = *Bacillus thuringiensis israelensis*

[1] In the event of emergency outbreaks that include the active spread of vector-borne diseases, including those defined under California Government Code Section 8558, the District may have to use products not listed above. These products will be determined at the time of emergency and will be used in accordance with all applicable state and federal laws.

Information on each product can be found on the webpage "Registered Products in California" (CDPR 2026).

2.3 Public Health Emergency Declarations (Adulticide)

IMM programs initiate adult mosquito control when public health emergency action levels or thresholds are reached or exceeded (CDPH 2023, 2025). Thresholds are based on local sampling of the adult mosquito population and/or when the risk of mosquito-borne disease increases above levels established in the California Mosquito-Borne Virus Surveillance and Response Plan (CDPH 2025, or its successor) and the District's PAP. Thresholds are an integral component of mosquito control because they provide a range of predetermined actions based on quantified data. Thresholds also establish expectations and boundaries for responses that ensure appropriate mosquito control activities are implemented at the appropriate time. The threshold for adult mosquito control depends on several factors including:

- How citizens tolerate nuisance mosquitoes, based on public service requests
- Overall mosquito abundance
- Presence of mosquito-borne disease in the region
- Abundance of mosquito species that are vectors of disease
- Local acceptance of adult mosquito control activities
- Climate data (CDPH 2023)

These recommended thresholds are coordinated with CDPH may vary depending on location or CDPH medical guidance. If local transmission of a disease is confirmed, thresholds will likely decrease. If a trap count exceeds the threshold, the area surrounding that trap is surveyed to identify and treat the active breeding site. For many species, mosquito activity is greatest from dusk to dawn. However, as mentioned in the above mosquito biology section, *Aedes* mosquitoes are important vectors that continue to bite during the day.

In the event of public health emergency conditions, comprising an actual or imminent disease outbreak declared by the CDPH, the District's activities could temporarily vary through increases in scope or intensity of methods, equipment (e.g., amphibious vehicle), and potentially through use of legal pesticides, in strict conformance with label requirements, which are not routinely used by the District. These activities would be temporary in nature and similar to routine activities. The California Natural Resources Agency and Governor's Office of Land Use and Climate Innovation have recognized that emergency conditions may require prompt action of a nature or intensity above typical levels to protect public health, welfare, safety, or property, and has exempted these activities from requirements for further environmental review (Cal. Code Regs., tit. 14, § 15000 et seq. [the "CEQA Guidelines"] Sections 15269, 15359).

Public health emergencies requiring adulticides are rare and the use of adulticides is outside the scope of the IMVMP. The District has not needed to do any aerial adulticide applications in documented history and would only do so in the case of an extensive outbreak of disease in an area larger than what could be covered by truck-mounted sprayers in a couple of days. Aerial spraying may be done using appropriately labeled pesticide(s) and application equipment; however, all aerial spraying operations must be reviewed and approved by the respective land manager and is coordinated with Santa Barbara County Department of Public Health, and CDPR. The District is one of the few members of the MVCAC that does not have the equipment and staffing to spray adulticide in the event of a public health emergency. Therefore, this future use or activity is not proposed for inclusion in the Plan.

3 Non-Mosquito Vector Management

(Public Review note: The education and outreach program will be included in the final Plan)

4 District Proposed Best Management Practices

The District is required to comply with all federal and state environmental laws and the H&S Code to prevent environmental harm while reducing or eliminating mosquito production. The District follows vector control guidance documents and BMPs prepared by the CDPH that detail surveillance methods, vector control management strategies, and pesticide application procedures established under:

- *Best Management Practices for Mosquito Control in California* (CDPH 2023), a manual that provides guidance on habitat management, IMM principles, and land-use-specific guidance to prevent mosquito production.
- *The California Mosquito-Borne Virus Surveillance and Response Plan* (CDPH 2025), which establishes statewide public health surveillance protocols and response thresholds and is updated annually
- Statewide National NPDES Permit for Biological and Residual Pesticide Discharges to Waters of the United States from Vector Control Applications (Order No. 2016-0039-DWQ) and the District's PAP Appendix B).
- *Best Management Practices for Mosquito Control on California State Properties* (CDPH 2008), applicable for State-owned lands (e.g., University of California, CDFW Goleta Slough Reserve).
- Other management practices and guidance documents that are regularly updated and published on the CDPH Vector Borne Diseases Section website.

Selection and implementation of BMPs will consider effectiveness, environmental conditions, and operational feasibility, consistent with IVM principles that prioritize adaptive, site-specific decision-making (MVCAC 2020, Appendix A)

4.1 Countywide General Best Management Practices

BMP-01 General Chemical and Biological Controls. Treatments applied by the District are approved by the CDPR and their application shall continue to abide by all label instructions and regulations of the USEPA and CDPH, including application rates and methods, storage, transportation, mixing, and container disposal. In addition, the District will continue to comply with all pesticide reporting, equipment calibration, and inspection requirements as regulated by the County Agricultural Commissioner.

In accordance with CDPH regulations, pesticides shall only be applied by Certified Vector Control technicians. Technicians who apply pesticides will continue to complete all training required by CDPH to maintain status as a Certified Vector Control Technician and will follow the District's comprehensive documents, including the annual Engineer's Report, strategic response plans, and Standard Operating Procedures to avoid and minimize negative environmental impacts. These activities are conducted in accordance with the BMPs described in the *Best Management Practices for Mosquito Control in California* (CDPH 2023), *Best Management Practices for Mosquito Control on California State Properties* (CDPH 2008), and in the *California Mosquito-Borne Virus Surveillance and Response Plan* (CDPH 2025, or as updated annually), in order to ensure pesticides are selected and applied appropriately and potential impacts on non-targeted areas are eliminated or minimized.

Pesticides will be applied at the lowest effective concentration for a specific, targeted set of vectors and site conditions. Application rates will never exceed the USEPA- and CDPH-approved maximum label application rate. All pesticide application equipment is currently and will continue to be calibrated and inspected annually as required by regulating agencies, such as CDPH and the County Department of Agriculture, Weights, and Measures.

Pesticide application shall be modified, postponed, or ceased when weather parameters exceed product label specifications, such as when a high chance of rain is predicted and rain is a determining factor on the label of the material to be applied.

BMP-02 Surveillance-Triggered Treatments and Least-Toxic Larval Control. Microbial larvicides (Bti, Bs) or insect growth regulator (e.g., methoprene) will be used as the primary treatment method when necessary to control mosquito larvae. Only when necessary may surfactants be used to control late-stage larvae or pupae. The District will maintain treatment records (location, date, method, product, rationale based on surveillance, amount applied, applicator name) to support adaptive management and minimize repeated application.

BMP-03 Vector Control State Water Resources Control Board Permit. Chemical controls applied within waterbodies defined by federal and state regulations as wetland and/or non-wetland Waters of the United States and/or state must be used in accordance with the Statewide NPDES Permit for Biological and Residual Pesticide Discharges to Waters of the United States from Vector Control Applications (Order No. 2016-0039-DWQ, General Permit No. CA990004).

BMP-04 Local Integrated Pest Management Plan Consistency. Unless inconsistent with the District's authority provided under the H&S Code, District activities may be consistent with chemical use as directed under any Integrated Pest Management Plan or similar guidance or policies adopted by the local jurisdiction or applicable to state or federally managed lands (e.g., CDPH 2008 *Best Management Practices for Mosquito Control on State Properties*). Additionally, habitat management plans or other public or private agreements may determine the products used in a particular area, to the extent consistent with the District's authority under the H&S Safety Code.

BMP-05 Interagency Communication. For individual activities located within federal, state, or local wildlife refuges, preserves, or conservation areas, the District will continue to coordinate, review activities, and collaborate with applicable agencies, including UCSB, CDFW, and local agencies, municipalities, and property owners. The District will also continue to coordinate with various land managers and Resource Agencies (e.g., USFWS, United States Army Corps of Engineers, Central Coast Regional Water Quality Control Board, and CDFW) as needed to minimize the impacts of IMVMP activities on waters and biological resources within designated reserves and refuges. Methods to minimize impacts to special-status species, habitats, and wildlife are agreed upon prior to entering protected and sensitive habitats. The District will continue to foster these relationships through communication and collaboration.

The District will coordinate with the Santa Barbara County Flood Control District (SBCFCD) on notification for any winter management activities affecting potential mosquito habitat hydrology so that the District can make timely applications of larvicide if necessary. The District will coordinate with local planning departments to ensure the District is notified when new stormwater detention systems are proposed as part of discretionary applications and environmental review.

BMP-06 Emergency Adulticide Guidance. Adulticide use, while not anticipated and not applied directly by the District, should adhere to following conditions, consistent with IMM principles that control actions are based on surveillance and risk:

- **Trigger Criteria:** Documented surveillance indicators demonstrate elevated public health risk or substantial nuisance levels not controllable through larval measures alone.
- **Least-Impact Method:** Use the least dispersive feasible method and timing to minimize exposure to non-target organisms.
- **Avoidance Areas:** Establish avoidance areas for sensitive habitats and known bird/animal roosting/nesting concentrations to the maximum extent feasible.
- **Notification and Evaluation:** Provide public/agency notifications as applicable and document effectiveness and need for any repeat action consistent with IMM evaluation principles.

5 Special Coastal Procedures

The California Coastal Act (CCA) places a high priority on the protection of biological and natural resources. In general, only land uses that are dependent on the habitat resources are allowable within ESHA areas. This Special Coastal Procedures Section identifies District proposed BMPs and procedures to implement in the future that are associated with mosquito surveillance and larval control activities in environmentally sensitive habitats in the District's Enhanced Service Area as shown on Figure 2 and Figure 3. The Goleta Slough Ecosystem Management Plan (GSEMP) area is used as a representative case study under Appendix C; however, the analysis and BMPs apply to all District activities within the coastal zone.

The Special Coastal Procedures presented below apply to the entirety of the ESHA treated in the coastal zone from Goleta to Carpinteria as shown in Figure 2 and Figure 3. These areas include, but are not limited to, Carpinteria Salt Marsh, Andrée Clark Bird Refuge, Mission Creek Estuary, Arroyo Burro/Las Positas Creeks, Atascadero and Cieneguitas creeks, More Mesa, Goleta Slough, University of California Santa Barbara (UCSB), Devereux Lagoon, and lower Tecolote Creek. Sensitive coastal habitats in the northern portion of the county (e.g., Santa Ynez River Estuary) are on Vandenberg Space Force Base, which as a federal military installation is responsible for its own vector control.

5.1 Special Coastal Procedure BMPs

The Special Coastal Procedure (SCP) measures below are proposed by the District throughout the coastal zone considering most activities are in ESHA.

SCP-01 Vehicle Use. The District will restrict vehicle access to existing paved or unpaved roads, levees, and established access routes to the maximum extent practicable. Interior coastal wetland areas designated as ESHA will be accessed on foot only to the maximum extent practicable. Vehicle speeds on levees and access roads adjacent to aquatic habitats will not exceed 15 miles per hour to minimize noise, dust, and wildlife disturbance. Vehicle maintenance and refueling is conducted in off-site service yards and gas stations.

SCP-02 Watercraft. Watercraft may be utilized to access aquatic environments where access is permissible (e.g., outside a Marine Protected Area), including but not limited to marshes, lagoons, and estuaries, to conduct surveillance and control of vectors and when their use would reduce the risk of potential impacts that may otherwise occur from land-based vehicles. Operation of watercraft within CDFW-owned lands/easements and Marine Protected Areas, University-owned lands and preserves, and other open space areas would be completed in coordination with CDFW, University, and/or other applicable land managers and agencies and would follow avoidance and minimization measures as required by the relevant agencies and right-of-entry, Special Use, and other relevant permits.

SCP-03 Mosquito Fish Use. Only allowed in closed systems that are hydrologically disconnected from naturally occurring wetlands, creeks, or sensitive areas (e.g., Lake Los Carneros).

SCP-04 Worker Education Awareness Program. Technicians shall receive annual training regarding techniques and procedures to identify and avoid or minimize negative effects to protect state-and/or federally listed threatened or endangered species, ESHA, and wildlife and plant habitat. Technicians shall receive annual training on the identification of sensitive biological resources, including sensitive habitat and special-status species (e.g., vernal pools, salt marsh habitat, bird species).

A fact sheet conveying this information shall also be prepared for distribution to all District field technicians, their employees, and other personnel involved. Employees shall sign a form provided by the trainer documenting they have attended the Worker Education Awareness Program and understand the information presented to them. The Operation Manager Biologist and/or District lead field technician

shall be responsible for ensuring District members adhere to the guidelines and restrictions designed to avoid impacts to special-status species.

SCP-05 Surveillance, Treatment, and Access ESHA Avoidance. The District shall exercise caution when entering ESHAs to minimize impacts to these environments. Staff shall use established routes to the maximum extent feasible and avoid impacting sensitive vegetation. Technicians are required to remain mindful of wildlife during walking treatments and stay on designated pathways when appropriate to do so. If a technician must leave designated pathways, they must be mindful of avoiding nests, eggs, or other wildlife features.

SCP-06 ESHA and Resource Mapping Database. Before conducting monitoring or treatment, a Certified Vector Control Technician will review applicable permits or agreements, or other notes discussing environmental constraints/requirements, points of access, or any other pertinent information prior to visiting a site, such as existing ESHA mapping from each jurisdiction (where available and applicable). Sensitive sites may include, but are not limited to, coastal salt marshes, CDFW or university-owned or operated lands, easements, and preserves; County-owned parks and open space areas; or USFWS/National Marine Fisheries Service designated critical habitat.

Prior to entering an ESHA or other site that has the potential to contain sensitive habitat or species, the technician will identify suspected vector breeding sources using such resources as satellite images, topographic maps, historical records, or on-site evaluation to help ascertain the least environmentally impactful way to access the site. If more than one access route is available, staff will prioritize the path that would minimize or avoid environmental impacts to sensitive biological resources.

Staff will also discuss preferred access points, methods, and paths for reaching vector breeding source(s) with the supervisor and/or land manager.

SCP-07 Aquatic Invasive Species and Decontamination. All activities will be in compliance with federal, state, or local laws, ordinances, or permits to the extent they do not conflict with the District's authority under the H&S Code. If equipment is operated without contacting water or wetted soils, work can be conducted between regions and watersheds without specialized decontamination procedures. For wet/muddy equipment, prior to moving between watersheds vulnerable to aquatic invasive species (e.g., Goleta Slough and Carpinteria Saltmarsh), technicians must decontaminate all tools, waders, boots, and other equipment come into contact with water or wetted soils. Decontamination must be consistent with the *CDFW Aquatic Invasive Species Decontamination Protocol* (2022) as feasible, both before entering and after exiting wetlands in different watersheds.

The District will properly train all staff, contractors, and volunteer help to prevent spreading weeds and invasive animal species (e.g., New Zealand mud snails) or pathogens (e.g., the fungus that causes chytridiomycosis in amphibians) to other sites. Decontamination methods to clean equipment of invasive species and pathogens will be included in worker training and be implemented when working between different watersheds.

SCP-08 SCP Communication. To ensure ecological resource considerations are incorporated into operational planning, the District may update the website and engage stakeholders (e.g., Goleta Slough Management Committee [GSMC]) prior to annual treatment cycles or as seasonally appropriate for resources (e.g., nesting bird season).

a. Annual Coordination

- Prior to initiation of vector management activities in early winter, the District will establish communication protocols.
- One example is attending GSMC. The District presentation at GSMC specific to that management area may include:
  - Review of planned vector-control activities within or adjacent to ESHAs
  - Identification of ecological constraints, seasonal restrictions, and mitigation applicable to vector-control operations
  - The District may consider incorporating recommendations into its operational plan.

b. Activity Reporting

- The District will prepare and submit to the District's Board of Trustees a summary documenting the following in the previous season:
  - Vector-control activities conducted in sensitive habitat (e.g., coastal salt marsh)
  - BMPs implemented to avoid biological impacts
  - Any recommendations and how they were addressed
  - Any adaptive management modifications for the following year

SCP-09 Nesting Bird Season Monitoring, Surveys, and Nest Avoidance. To avoid disturbance of nesting and special-status birds, including raptor species protected by the Migratory Bird Treaty Act and California Fish and Game Code Section 3503, as feasible, the District will schedule winter mosquito surveillance and treatment activities prior to bird breeding season for migratory birds (February 1 through August 31). However, late winter and summer mosquito surveillance and treatment are required during the nesting bird season.

For District activities during the breeding season, a pre-activity nesting bird survey shall be conducted only where vector management activities are to occur. The pre-activity nesting bird survey shall be conducted on foot from the interior access and activity area. The survey shall be conducted by a biologist familiar with the identification of avian species known to occur in Southern California coastal communities. If nests are found, the nest will be avoided by the technicians on foot and GPS coordinates recorded. All personnel conducting vector management activities shall be notified as to the presence of an active nest avoid disturbance while the nest is still active.

While encounters with special-status species are not likely or anticipated, any personnel who encounters a dead, injured, or entrapped special-status member of such species shall immediately report the incident to the General Manager of the District. If a species is legally protected, the District shall follow up with written notification to USFWS and/or CDFW (as applicable).

SCP-10 Tidal Marsh Specific BMP. Technicians will receive annual training and review of this document to remain up to date and current on this document and its methodologies for protecting sensitive species and the marsh habitat. District will minimize travel in the coastal salt marsh and tidal channels to reduce impacts to vegetation used as habitat. Technicians will continue to consider applicable measures, such as the USFWS guidance "Walking in the Marsh: Methods to Increase Safety and Reduce Impacts to Wildlife/Plants" (USFWS, undated, Appendix D).

SCP-11 Coastal Salt Marsh Nesting Season Survey Avian Monitoring. The following apply to surveillance and larvicide treatments in tidal and non-tidal coastal salt marsh plant community areas that provide Belding's Savannah sparrow (*Passerculus sandwichensis beldingi*, BSS) habitat during breeding season (approximately mid-March to mid-July). In the District Enhanced Service Area, these areas are assumed to include the Santa Barbara Airport Basins A through H; Devereux Slough, and Carpinteria Salt Marsh.[7] Implementation shall occur in coordination with the lead agency and/or land manager (e.g., CDFW Reserve Manager, University of California Reserve, or City of Santa Barbara Airport Operations) for escort and access considerations.

- **Early Nesting Season Pre-Activity Baseline Survey**. Within 24 to 72 hours of the first surveillance/treatment during the BSS breeding season (after March 15) in suitable habitat, a qualified biologist familiar with BSS[8] shall conduct a focused survey consistent with the agency guidance methodologies[9] for BSS breeding behavior within the areas typically treated by the District in the

[7] Based on current review the California Natural Diversity Database mapping (CNDDB, CDFW 2025) and other sources.

[8] Experience may include specialized training or workshops on nesting bird survey techniques and species-specific ecology. Experience may include coastal bird monitoring, nest searching, endangered bird species management, or mentorship under a seasoned BSS biologist. Qualification must include multiple years (minimum 2+ years) of local experience/training/workshops and familiarity with the Goleta Slough and/or Carpinteria Salt Marsh ecosystem.

[9] No BSS protocol has been established by CDFW. Seasonal and daytime timing of the surveys is currently recommended consistent with other accepted survey efforts conducted throughout the state, such as Zembal and Hoffman 2010 and 2015.

spring/summer that overlap with known BSS habitat. Should any BSS be observed acting territorial (perching or singing) or nesting, GPS coordinates reported to technicians prior to activities. Based on locations the District will prepare an alternative access and treatment plan for those areas focusing on the lower elevation treatments areas and avoidance of higher elevation nesting habitat. The baseline survey may need to be repeated based on seasonal conditions (e.g., estuary mouth opens/closes, new pooling).

If escort restrictions prevent early access, the qualified biologist may conduct a same day early-morning (first-light) reconnaissance of basins proposed that day prior to mapping all areas.

- **Surveillance and Larvicide BSS Treatment Monitoring**. Technician entry into tidal basins during the nesting season shall occur under direct guidance of a qualified biologist. The qualified biologist will determine the intensity of monitoring based on activities, location, and survey results. Technicians shall minimize traversing from staging areas to the marsh and, once in the marsh, shall remain in lower, wetter depressions used for mosquito treatments while avoiding elevated “rises” where nests are most likely. Pre-entry briefings, same-day route validation, and adaptive rerouting shall be used as needed to avoid potential nest areas. As necessary Qualified biological monitor observations during activities will update the initial surveys and include GPS coordinates, recommended avoided rises and treatment depressions, reroute decisions, and adaptive management notes for future activities.

  Technicians shall receive training on bird identification and nesting behavior, recognizing rises vs. depressions, interpreting microtopography, and low-impact foot access techniques in pickleweed marsh.

- **SCP-12 Trash Removal.** When feasible (i.e., with existing labor and vehicles), existing litter or debris in ESHA will be removed and properly discarded.

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Appendix A

Integrated Vector Management is Critical for Protecting Public Health, Mosquito and Vector Control Association of California (2020)

INTEGRATED VECTOR MANAGEMENT IS CRITICAL FOR PROTECTING PUBLIC HEALTH

MVCAC

Mosquito and Vector Control Association of California

January 2020

MOSQUITOES ARE THE WORLD'S DEADLIEST ANIMAL

Despite their small size, mosquitoes have a tremendous impact on human health. When a female mosquito takes a meal of human blood to develop her eggs, she can transmit potentially devastating pathogens. Worldwide mosquito-borne diseases kill over one million people each year.[1] Most of these are caused by malaria, a debilitating parasite that, though rarely encountered in California today, was the driving force behind the formation of mosquito control districts in the 1920s.

West Nile virus, the most prevalent mosquito-borne disease in the state, has sickened nearly 7,000 Californians and killed over 300 residents since it was first detected in 2003. There are no human vaccines to protect against many mosquito-transmitted viruses which are costly to treat and can have long-term health and economic consequences.[2]

The recent establishment of the invasive mosquitoes, *Aedes aegypti* and *Aedes albopictus*, in California presents additional challenges. In addition to being persistent day-biting nuisances, these mosquitoes are capable of transmitting several imported pathogens including Zika, dengue, and chikungunya viruses.[1] These pathogens are associated with debilitating diseases, with Zika virus being linked to birth defects when women are infected during pregnancy.[3] These pathogens have the potential to be introduced into the local mosquito population if mosquitoes take blood meals from infected travelers returning from a region where transmission is occurring.

A vector control technician dips water to check for mosquito larvae.

Photo credit: San Gabriel Valley Mosquito and Vector Control District

The risk that unchecked mosquito populations pose to public health is significant and there must be a variety of tools available through an Integrated Vector Management approach in order to effectively protect public health.

MOSQUITOES ARE PROLIFIC AND ADAPTIVE

California is home to more than 50 mosquito species[4], and each one uses sources of standing water to breed. From date palm groves to tidal marshes to tule-laden ponds, millions of mosquitoes emerge each year to bother and sicken residents. Two of the most abundant and widespread mosquito species in the state, *Culex tarsalis* and *Culex pipiens/quinquefasciatus*, are the primary vectors of a number of mosquito-transmitted encephalitis viruses, including West Nile virus.[5]

In addition to being able to exploit natural and agricultural water sources, some mosquitoes have adapted to thrive in man-made water sources in urban and suburban areas. Chief among these are some of California's newest arrivals, *Aedes aegypti* and *Aedes albopictus*.[6] These invasive mosquitoes can develop in very small amounts of water that collect in pots, plant saucers, rain barrels, corrugated tubing connected to yard drains, and even tree-holes and leaf axils of landscape plants.[7] *Aedes* eggs are laid above the water line in containers and can last for months before hatching when submerged in water. After rain or irrigation, a single residential yard can have hundreds of potential mosquito sources. Water conservation and other water management practices can considerably reduce mosquito production and the risk of mosquito-borne diseases.

MOSQUITO AND VECTOR CONTROL DISTRICTS FACE A DAUNTING TASK

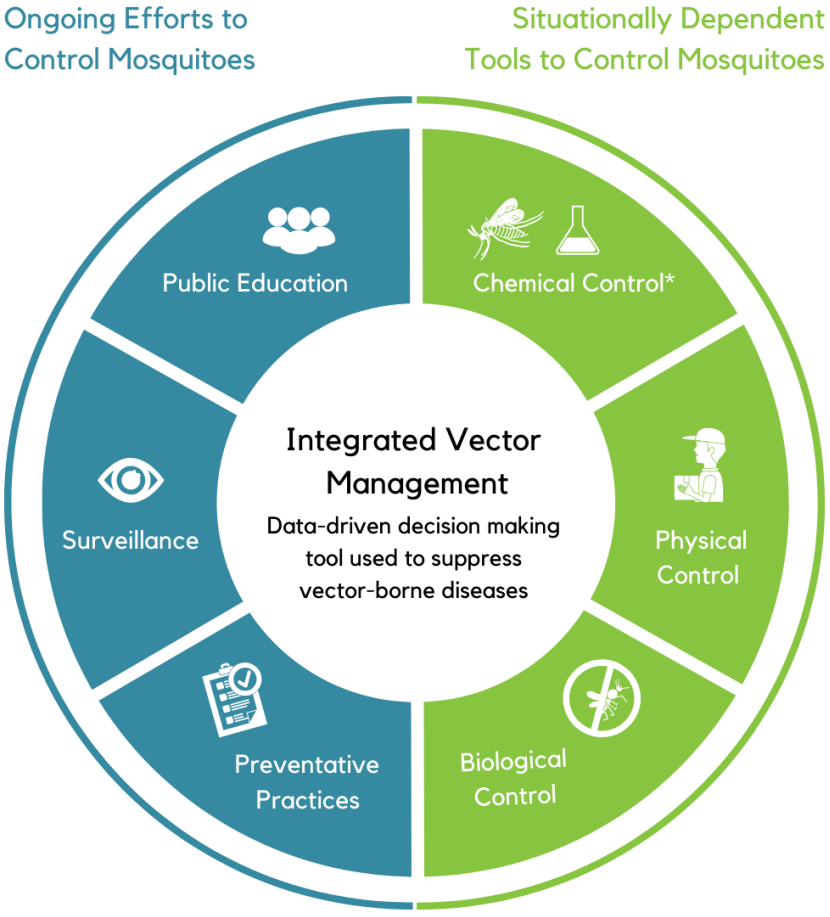
In agricultural and residential pest control, low levels of pest infestation may be tolerated. However, the tolerance for mosquitoes is different as they can pose a risk to human health. Unfortunately, even large mosquito and vector control districts lack the resources to prevent all mosquito-borne disease risks within their jurisdictions. The spread of invasive *Aedes* mosquitoes and the desperate need to prevent the emergence of Zika, dengue, and other viruses has further strained mosquito and vector control districts' limited resources. There is not one solution to controlling mosquitoes – the most effective way to protect public health is to follow Best Management Practices[8] through strategic application of an Integrated Vector Management (IVM) program.[9]

IMPACT OF INVASIVE *AEDES*

Invasive *Aedes* require unique surveillance and control methods which put a significant burden on local mosquito and vector control districts. For example, a Southern California district's operational expenses increased by 34% in one year to deal with these invasive mosquitoes. All districts with invasive *Aedes* detections have had to increase staff, equipment, and traps, and develop additional outreach efforts and materials.

THE VARIED TOOLS OF IVM

Integrated Vector Management is an evidence-based, data-driven decision making tool used to suppress vector-borne diseases. IVM prioritizes surveillance of mosquito populations, removal of breeding sites, public outreach, and education campaigns. IVM incorporates various tools to target mosquitoes at different life stages which can include chemical control. When implementing a control program, districts continually evaluate the strengths, weaknesses, risks, and resource cost of each type of intervention to determine what combination in a given area is most appropriate for the current risk posed to public health from mosquitoes and the pathogens they transmit.[10, 11]



All components of IVM target mosquitoes at their different lifecycle stages, but chemical control is the sole means of eliminating adult mosquitoes over a large area.

COMPONENTS OF INTEGRATED VECTOR MANAGEMENT

Public Education

Involves outreach and community engagement to encourage the public to protect themselves from mosquito bites and prevent mosquito breeding.

Tactics can include earned media, social media outreach, paid advertisements, youth programs, and attendance at community events.

Surveillance

Mosquito abundance and disease surveillance enables districts to make informed decisions about where to focus resources and what level of intervention is required.

Surveillance data also helps districts evaluate the efficacy of the control measures.

Preventative Practices

Integrates vector management strategies into land use and local and regional planning activities.

Encourages good water management and mosquito-prevention habits.

Benefits: can reduce the need for pesticide applications.

Drawbacks: requires considerable public investment, time, and ongoing support for lasting change.

Biological Control

Natural approach that uses predators, such as mosquitofish, to reduce mosquito larvae and pupae. May involve other native fish to minimize adverse impacts to aquatic species.

Benefits: potential long-term and recurring control once successfully established.

Drawbacks: may not adequately eliminate mosquito larvae.

Physical Control

Changes a landscape to eliminate current and future mosquito production. May require support of the property owner or use of enforcement authority.

Benefits: complete elimination of mosquito larvae when effective.

Drawbacks: resource costs including specialized equipment and trained employees; inability to physically modify all sources of standing water; can be time intensive.

Chemical Control

Larviciding

Uses pesticides targeted at localized water sources that have mosquito larvae. Eliminates mosquitoes at the larval stage when they do not have the ability to feed on humans or animals and spread diseases.

Benefits: wide variety of products with high efficiency, specificity, and residual control.

Drawbacks: can be labor intensive to identify and target water sources containing mosquito larvae.

Adulticiding

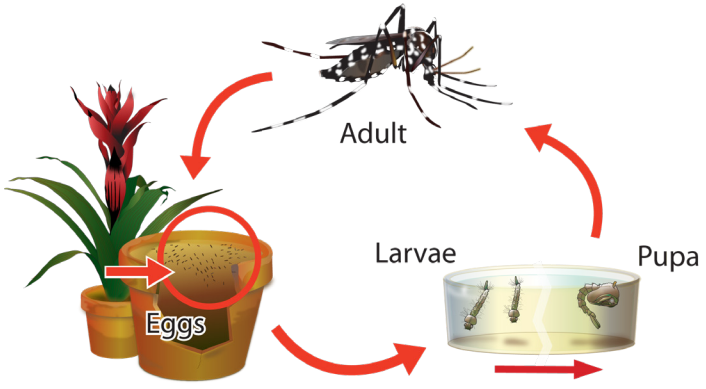
Requires precise timing of insecticides applied in very tiny droplets known as Ultra Low Volume (ULV) application. Sole means of quickly eliminating adult mosquitoes over a large area.

Benefits: reduces transmission of West Nile virus and other mosquito-borne pathogens; minimal public health risks.

Drawbacks: environmental conditions may affect efficacy.

USING SURVEILLANCE AND RISK ASSESSMENTS TO DIRECT MOSQUITO CONTROL OPERATIONS

Many mosquito and vector control districts provide service over large areas with a multitude of known mosquito sources. With newly-created mosquito sources caused by unmaintained swimming pools, residential and agricultural over-irrigation and stormwater capture, treatment and infiltration devices, it is vital to focus efforts where they are most needed. This is achieved through comprehensive surveillance of mosquito populations at all stages of the mosquito's life cycle.[12]



Life cycle: mosquitoes can develop from eggs to biting adults in just 5-7 days.

LARVAL SURVEILLANCE

Almost any standing water that persists for more than a few days has the potential to produce mosquitoes. The factors that favor mosquito development are multifaceted and are an ongoing focus for research, but a number of recurring mosquito source types have been identified in residential, industrial, agricultural, and natural settings. Districts identify these locations and regularly assess the population of mosquito larva, which are then identified by type (genus or species) and life stage. Records of these assessments and the sources from which they arose are maintained often in a georeferenced database for ease of review.

The purpose of larval surveillance is to determine both short-term and long-term actions. Larval surveys can indicate periods of high population that determine when a particular source should be inspected, how often it should be inspected, and help identify factors (i.e. over-irrigation) that can be eliminated by working with the landowner. They can also help determine which control tools districts should use. For example, more immediate and aggressive control measures will be needed if the water source has disease vectors. Surveillance data is also used to evaluate the efficacy of control efforts by determining the extent and duration of larval suppression.

Vector control professionals often use a 'dip count' which measures the number of mosquito larvae collected per dip of water to evaluate mosquito populations.

Photo credit: Orange County Mosquito and Vector Control District

ADULT MOSQUITO SURVEILLANCE

One of the largest components of any vector control operation is surveillance directed at adult mosquitoes because this is the stage that mosquitoes transmit diseases. Since identifying all potential mosquito sources is not possible, districts rely on monitoring adult mosquito activity to identify and prioritize problem areas.

A vector control technician sets a mosquito trap.

Photo credit: San Gabriel Valley Mosquito and Vector Control District

An adult mosquito surveillance program consists of a combination of fixed sites and "floating" sites that are identified in response to resident reports, technician inquiries, human or animal disease detections, or other indicators. Fixed sites provide consistent population data for set areas and serve as a baseline for comparing year-to-year activity. Floating sites allow for quick assessment of potential problem areas and can be used to evaluate the need for additional control or surveillance activities. Adult mosquito surveillance can aid in the identification and treatment of previously undetected larval sources.

There are a variety of traps used to capture adult mosquitoes, but most target one of two adult mosquito behaviors: host-seeking (female mosquitoes looking for a blood meal) and oviposition (females seeking a water source where they can lay their eggs). Traps are placed over a short period of time and contain live mosquitoes when recovered. Samples are sent to district labs where they can be sorted, counted, identified by species, and tested for mosquito-borne viruses.

Laboratory staff sort, count and identify adult mosquitoes.

Photo credit: Contra Costa Mosquito and Vector Control District

DISEASE SURVEILLANCE AND RESPONSE

Mosquito and vector control districts are charged under the California Health & Safety code with protecting Californians against the discomforts, health risks and economic effects of vector-borne diseases.[13] Some districts have the capability to test their own mosquito samples for mosquito-borne viruses and others partner with the California Department of Public Health (CDPH) and the Center for Vectorborne Diseases (CVEC) at the University of California Davis for mosquito sample testing.

West Nile virus is currently the most common mosquito-borne disease in California and is a key target of surveillance efforts. In addition to testing mosquito samples, districts also test dead birds reported by the public[14] and some districts use sentinel chickens to detect active transmission of West Nile virus.[15] Records of viral infection in humans may also be reported by local health districts. While these reports can serve as definitive proof of active virus transmission between mosquitoes and humans, they are often of limited utility in directing operations due to time elapsed between patient infection and the district's notification of the confirmed disease case.[16] Because of this, earlier indicators of disease activity such as mosquito samples and dead birds are used to inform effective intervention efforts.[17]

CALSURV: STATEWIDE SURVEILLANCE DATABASE

California started the first statewide mosquito abundance and disease surveillance database called CalSurv.[20] Surveillance and operations data from local districts are entered into the database for rapid reporting and analysis which aids in the direction of vector control programs. Districts can also access past surveillance data to track trends in mosquito activity or use in applied research. CalSurv's data visualization capabilities help districts use surveillance data to determine the most appropriate and effective IVM control components. CalSurv has expanded and now there are similar systems in Arizona, New Jersey, Tennessee, Utah, and Guam.

Comprehensive mosquito abundance and disease surveillance data allows districts to make informed decisions about where to focus resources and what level of intervention is required. This can be particularly important when considering costly and publicly visible interventions such as large scale area spraying or door-to-door inspection teams. To ensure consistent responses, CDPH has developed a number of disease response plans that factor in a variety of surveillance data and environmental conditions to determine a risk level associated with disease transmission.[12, 18, 19] These plans are widely used by districts and are often incorporated into local operation plans.

PREVENTATIVE PRACTICES: SOURCE PREVENTION AND ELIMINATION BY AN ENGAGED POPULACE

Preventative practices involve a wide range of efforts focused on encouraging good water management and mosquito prevention habits. Best Management Practices[8] (BMPs) have been developed for common land uses that typically create mosquito sources providing details on changes in practices and land modifications that can readily decrease mosquito production and protect public health. Greater support for integration of BMPs is needed at the political and regulatory levels to ensure integration of sound vector management strategies into local and regional planning efforts.

For residential and suburban areas, preventative practices are typically focused on eliminating man made container sources in and around the home. This includes discarding unnecessary containers that can hold water and frequently dumping or draining water sources that cannot be eliminated as mosquitoes can develop from eggs to biting adults in just 5-7 days.

When successful, preventative practices to control mosquitoes have minimal costs, are more sustainable, and reduce the need for pesticide applications. However, successful preventative practices control programs require considerable public investment and ongoing support for lasting change.[22] Districts' capacity for outreach varies, with larger and better funded districts typically having a greater ability to implement a robust public outreach program.

PREVENTATIVE MOSQUITO CONTROL SAVES TIME AND RESOURCES

When the economic downturn of 2007-2008 led to a rapid increase of foreclosures, mosquito and vector control districts quickly realized that unmaintained swimming pools at vacant properties were producing thousands of mosquitoes within a matter of days. Recognizing that waiting for resident complaints or fortuitous trap placement was insufficient, districts sought to identify unmaintained pools before mosquitoes began to emerge. This entailed high elevation aerial photography and outreach to real estate and community partners to identify foreclosed and abandoned homes and allow technicians to systematically inspect these sources.[21]

Tools for outreach and community engagement include comprehensive earned and social media, paid advertisements, youth programs, and attendance at community events. This outreach is designed to encourage the public to protect themselves from mosquito bites by using CDC-approved repellents, wear protective clothing, prevent mosquito access to the home, and avoid outdoor activities during peak periods for disease-transmitting species.

Successful mosquito and vector control requires an engaged community actively thinking about and eliminating mosquito sources. Forming strong working relationships with community groups and other government agencies effectively expands the mosquito control workforce well beyond a local district's staff. The challenge of keeping the public informed and motivated, however, limits the overall impact of preventative practices on mosquito populations and makes the use of additional interventions necessary.

Public outreach, from billboards to social media to community events, is an integral component of IVM.

Photo credit: Sacramento-Yolo Mosquito and Vector Control District

PHYSICAL CONTROL: CHANGING THE LANDSCAPE TO PREVENT RECURRENCE

Physical control involves modifying a mosquito source to eliminate or significantly reduce current and future mosquito production. At the smallest scale this can involve dumping and draining backyard container sources[23] and on a larger scale it can involve managing water flows in salt marshes or levelling flooded grounds.[24] While some of these interventions permanently eliminate future production of mosquitoes on the property, others require periodic maintenance to remain effective.

Limitations of physical control include resource costs and the ability to physically modify mosquito sources. Removing water from backyard container sources, while effective, requires many employees to complete door-to-door inspections. Larger scale projects often require specialized equipment and trained employees. One example is when districts send staff into a flood control channel with hand tools and equipment to remove vegetation and sediments during non-storm periods to keep the water flowing.

Vector control staff use ditching to restore tidal flow to a coastal marsh.

Photo credit: Marin/Sonoma Mosquito and Vector Control District

In addition, not all sources of standing water can be physically modified. Flood-irrigated agricultural sources such as rice and natural standing water sources such as peripheral river seepage points or wetlands cannot be drained or significantly modified without severely interfering with their intended purposes. Even when a source is eligible for physical control significant modification to the property requires cooperation by the property owner. Districts typically try to do this through affirmative outreach and engagement though districts have the power to enforce changes through statutory abatement.[25] The effectiveness of both physical control and preventative practices is dependent on the community's receptiveness to district outreach and engagement efforts and their tolerance for use of enforcement authority against the few property owners that are unwilling to comply.

TIDAL RESTORATION PROJECTS CAN PREVENT MOSQUITO BREEDING

Abandoned salt ponds around the San Francisco Bay have become seasonal wetlands breeding large numbers of saltmarsh mosquitoes in the winter months. These mosquitoes can fly up to 15 miles inland presenting a severe biting nuisance to nearby residential areas. In the 1990s, tidal restoration projects around the Bay – including disking, ditching, dredging, and the installation of tidegates and siphons – permanently reduced the number of acres of mosquito breeding habitat in abandoned salt ponds. This saved tens of thousands of dollars and eliminated the need for ongoing pesticide applications in these areas.

BIOLOGICAL CONTROL: TAKING ADVANTAGE OF MOSQUITOES' NATURAL PREDATORS AND PARASITES

Biological control is defined as using a vector's natural enemies to reduce the population of the target vector typically with the assistance of human activity.[26] Fish have long been used to manage immature mosquito larvae and pupae. Mosquitofish (*Gambusia* sp.) remain the most widely used fish for mosquito control because of their hardiness, high potential for reproduction, and ability to feed readily on mosquito and other insect larvae.[27, 28, 29, 30, 31, 32]

Mosquitofish feed on mosquito larvae and pupae. They provide effective control when used alone or with larvicide applications in a variety of standing water habitats ranging from ornamental ponds to neglected swimming pools. However, mosquitofish do not serve as a cure-all for ongoing mosquito management. Mosquitofish should be used thoughtfully and strategically in appropriate sources to minimize any adverse impacts to other aquatic species, and when available, other native fishes should be considered for mosquito management.

A vector control technician releases mosquitofish into an abandoned swimming pool.

Photo credit: Contra Costa Mosquito and Vector Control District

Another component of biological control is encouragement of local, non-introduced predator populations. Several native aquatic invertebrates regularly prey on mosquito larva and in sufficient numbers can greatly reduce the production of a mosquito source. Mosquitoes tend to utilize recently-flooded and marginal waterways that other species are not as adept at colonizing. As such, it can be beneficial to create deep water continually-flooded predator reserves to facilitate rapid introduction of predator species upon flooding of adjacent lands.

Biological control is a vital part of IVM as it is one of the few approaches that provides the opportunity for long-term and recurring control once successfully established. It also tends to be popular with the public offering a more "natural" approach to mosquito control. The limitations in its degree of control and areas of use, however, require additional control methods to ensure adequate suppression of vector populations.[33]

OTHER "MOSQUITO EATERS"

While mosquitofish are an effective biological control tool, many organisms that people think of as 'mosquito eaters' aren't actually effective predators. Bats, birds, and dragonflies eat mosquitoes, but these animals have varied diets which means they don't eat enough mosquitoes to provide effective mosquito control.

CHEMICAL CONTROL: TO SPRAY OR NOT TO SPRAY?

Chemical control methods are a major point of focus in mosquito and vector control operations, garnering both positive and negative attention. Public health pesticides play a vital role (though not a sole role) in IVM plans due to their versatility, effectiveness, and rapid deployment in comparison to other control methods. Yet pesticides have had a tumultuous history (mostly outside of public health) with an ever-changing regulatory landscape that creates uncertainty for users and the public alike.

Toxicity is a complex topic that involves a number of factors including the type and degree of exposure, dosage, and the biological traits of the target organism.[34] Products used in public health mosquito control are specifically formulated for elimination of mosquitoes and when used in accordance with the label they pose minimal risks to human health and non-target organisms. The use of these products for mosquito control is supported by the U.S. Centers for Disease Control and Prevention and the U.S. Environmental Protection Agency.[35, 36]

Public health pesticides play a vital role in IVM.

Photo credit: Placer Mosquito and Vector Control District

As applied to mosquito control, there are two main categories of pesticides: "larvicides"[37] which are used to control mosquitoes in their aquatic immature stages and "adulticides"[38] which target mosquitoes in their terrestrial adult stage.

LARVICIDES: CONTROL TARGETED DIRECTLY TO THE STANDING WATER SOURCE

General categories of larvicides include: surfactants/ suffocants (oils that suffocate the immature mosquito), insect growth regulators (products that interfere with larval growth and development), and bacterial-origin larvicides (products that contain insect toxins derived from bacteria). Within these categories there are many active ingredients and different formulations used for various methods of application and duration of effectiveness. Most larvicides are biorationals which means they are relatively non-toxic to humans and have minimal environmental impacts. Since each type of larvicide can only target certain stages of mosquito larvae and pupae an active control program requires the whole range of available tools.

WIDE-AREA LARVICIDING

Most mosquito larvicide applications occur directly to water sources, but mosquito control programs may also treat large areas with larvicides using truck-mounted equipment or helicopters. These applications can disperse small amounts of mosquito larvicide across many acres of land which helps prevent mosquito breeding in hidden water sources.[39]

Eliminating mosquitoes at the larval stage whenever possible is a core principle of IVM. To this end, mosquito and vector control districts focus their chemical control components primarily on larviciding. The reason for this is simple: at the larval stage the mosquitoes are concentrated in their water source and do not have the capability to feed on humans and animals and spread mosquito-borne pathogens.

A vector control technician treats a stormwater catch basin with a larvicide tablet.

Photo credit: Contra Costa Mosquito and Vector Control District

However, the main advantage of targeting larvae is also its greatest limitation: the water source containing the larvae must be identified and directly targeted. Whether a single storm drain treated by hand or acres of flooded field treated by plane, the larvicide product must find its way into the water. Use of larvicides also poses a challenge for resource management. Long-term residual products can allow for sustained control of a standing water source, but come at a significantly higher cost than short term products. Districts must not only identify active sources, but determine what type of treatment is required based on the mosquito production level and likelihood of recurrence. Districts work to continually identify, control, and when feasible remove active mosquito sources. Despite these efforts, not all sources can be discovered and adult mosquitoes will emerge heightening the public health risk.

A helicopter is used to apply larvicide to a marsh.

Photo credit: San Mateo County Mosquito and Vector Control District

ADULTICIDES PROVIDE WIDE-AREA APPLICATION, BUT HAVE A NARROW USE

Adulticiding involves the use of insecticides typically applied in very tiny droplets, a process known as Ultra Low Volume ("ULV") application.[40] During application adult mosquitoes come into physical contact with these droplets exposing them to the toxins. Since efficacy of adulticide applications relies in large part on the number of droplets that impact a flying adult mosquito, adulticiding requires precise timing. Most applications are made when there is the most mosquito activity and may be adjusted to correspond with environmental conditions.[41] Even when applications are made at optimum times, they will not be able to completely eliminate the adult mosquito population in the targeted area. Nonetheless, successful adulticiding has been correlated with reducing the presence of pathogens in mosquitoes within the areas that were treated.[42]

Adult mosquito control can be conducted using trucks or aircraft.

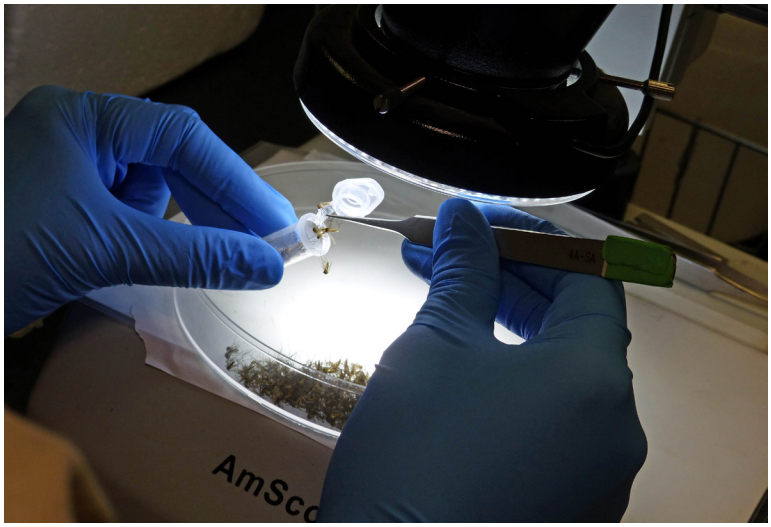
Photo Credit: San Joaquin County Mosquito and Vector Control District

There are a very limited number of active ingredients that can be used in adulticides that both control mosquitoes and protect public health. Most products used are either pyrethrins or pyrethroids which interfere with nerve function in targeted insects.[43] Unfortunately, mosquito populations can develop resistance to any or all of these products. While not widely used in California, organophosphate adulticide use is on the rise as considerable resistance to pyrethrins and pyrethroids is being detected in mosquito species that are a public health concern throughout the state.

Since adulticide applications are often made over large areas and are frequently focused in populated areas to reduce local disease transmission, the public is more likely to be exposed to these products. As a result, adulticiding operations often garner significant attention from the public, some of it negative. Districts work diligently to keep residents informed of their operations and, where feasible, avoid spraying when large crowds of residents may be outside. Districts take measures to ensure proper and safe application of products and adverse impacts on humans are not a realistic concern for adulticiding operations.[44] The products used present a minimal risk to the public's health and numerous studies have shown that ULV applications result in rates of exposure too low to be of public health concern.[45] Research also shows that large scale adulticiding events do not result in increased reports of adverse effects among people in the treated areas. When compared to the risks associated with unchecked virus transmission by mosquitoes, the use of adulticides as part of a comprehensive IVM program are easily justified, if not demanded.[46] Adulticiding remains the sole means districts have for rapidly targeting adult mosquitoes and has been demonstrated to reduce the transmission of West Nile virus and other mosquito-borne pathogens.[47, 48, 49]

EVALUATING EFFICACY OF OPERATIONS AND ENSURING ONGOING VIABILITY

Control of mosquitoes and other vectors is an ongoing process throughout the organism's active season.[50] Equally important to identifying and controlling mosquitoes are consistent evaluations of efficacy. The preceding sections have outlined advantages and disadvantages for various control techniques, but this is not a static assessment. What is the most effective tool for controlling mosquitoes in a particular situation involves a great number of variables, and an effective mosquito control program must constantly adapt to changing conditions.



Research and evaluation ensures that mosquito control operations continue to be viable despite ongoing challenges.

Photo credit: San Joaquin County Mosquito and Vector Control District

Evaluating efficacy of mosquito control measures will typically involve all aspects of larval and adult surveillance. By comparing assessments before and after treatment, the degree of reduction can be determined. When there hasn't been a significant reduction in mosquitoes, districts will determine whether there was an error in application (requiring retreatment and possibly revised protocols), a previously unknown source contributing to the problem or most problematically an indication of a pesticide resistant mosquito population.

Some mosquitoes have developed resistance to products used to control them at both the larval and adult stages.[51,52] To avoid promoting resistance, districts rotate products that have different means of killing mosquitoes. This can be difficult with adulticiding since there is a limited number of active ingredients. By capturing samples from known sources in the wild and comparing them against laboratory-raised mosquitoes that are known to be susceptible to various products districts can evaluate where resistance is appearing geographically and adjust their control programs accordingly. A similar process can be utilized during actual operations to determine whether a product is effectively reaching the target and whether the local mosquito population is susceptible to the product.[53] These evaluations provide beneficial information that allow for immediate adjustments to be made during an active mosquito season.

Districts may also carry out applied research projects related to various aspects of the IVM program. Whether designing or testing new surveillance equipment, measuring and classifying mosquito sources, or evaluating novel control techniques, these innovations are essential to maintaining a viable management program.

INTEGRATED VECTOR MANAGEMENT IS A SHARED RESPONSIBILITY

Integrated Vector Management is a rational decision-making process that utilizes public education, surveillance, source reduction and different control methods to reduce mosquito populations and protect public health. Cooperation between districts, elected officials, regulatory agencies, stakeholders and the general public is essential for successful implementation of IVM practices.

Ongoing public education to ensure there is accurate information is critical as is ensuring that residents have the tools to report mosquito activity and prevent mosquito breeding. All Californians must do their part by dumping and draining standing water so they can help eliminate mosquitoes from their communities.

At the same time, it's essential that mosquito and vector control districts have adequate funding to implement all of the various IVM tools needed to protect public health. With the introduction of new mosquito species and increased potential for mosquito-borne disease transmission in California, mosquito and vector control districts are facing new challenges and have increasingly limited resources to implement IVM. Onerous regulations and inadequate funding levels can compromise districts' ability to suppress mosquito populations and prevent the spread of mosquito-borne diseases.

Integrated Vector Management is a shared responsibility. By working together to strengthen collaboration, promote community engagement and education, and ensure there are adequate resources and funding for mosquito and vector control districts, we can minimize the risk mosquitoes pose to human health.

INVASIVE MOSQUITOES REQUIRE INNOVATIVE SOLUTIONS

Invasive *Aedes* mosquitoes (i.e. *Aedes aegypti* and *Aedes albopictus*) exploit small and cryptic water sources and have shown resistance to many commonly used insecticides, limiting the efficacy of traditional control approaches. One technique that is currently being evaluated in California is a form of Sterile Insect Technique that utilizes different strains of a naturally-occurring bacteria called Wolbachia.[54] When *Aedes aegypti* or *Aedes albopictus* males are infected with a particular strain of Wolbachia and then are released to breed with wild female mosquitoes infected with a different strain of Wolbachia the resulting offspring are not viable. Initial trials in Los Angeles County and Fresno County show great promise, but there are still logistical and regulatory hurdles to overcome. Implementation will likely have considerable costs and will require partnerships between local agencies and the state to ensure success.

FOOTNOTES

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MVCAC
Mosquito and Vector Control Association of California

Appendix B

State Water Resources Control Board Notice of Intent and Pesticide Application Plan

July 1, 2016

David Chang
Mosquito and Vector Management District of Santa Barbara County
P.O. Box 1389
Summerland CA, 93067

NOTICE OF APPLICABILITY FOR STATEWIDE VECTOR CONTROL PERMIT; MOSQUITO AND VECTOR MANAGEMENT DISTRICT OF SANTA BARBARA COUNTY;

Dear David Chang:

Thank you for submitting your complete application package for coverage under the Statewide Vector Control Permit[1]. Effective July 1, 2016, the Vector Control Permit regulates discharges of biological and residual chemical pesticides resulting from pesticide applications using the following active ingredients:

Larvicides

- Bacillus Sphaericus
- Bacillus Thuringiensis Subspecies Israelensis
- Methoprene
- Monomolecular Films
- Petroleum Distillates
- Spinosad
- Temephos

Adulticides

- Deltamethrin
- Etofenprox
- Lambda-Cyhalothrin
- Malathion
- N-octyl Bicycloheptene
- Dicarboximide (MGK-264)
- Naled
- Permethrin
- Piperonyl Butoxide
- Prallethrin
- Pyrethrin
- Resmethrin
- Sumithrin

In addition to the active ingredient list above, the Vector Control Permit regulates point source discharges of biological and residual pesticides from the application of minimum risk pesticides[2]. Users of products containing these ingredients or minimum risk pesticides are required to obtain

[1] Statewide National Pollutant Discharge Elimination System (NPDES) Permit for Biological and Residual Pesticide Dischargers to Waters of the United States from Vector Control Applications; State Water Board Order 2016-0039-DWQ adopted March 1, 2016 ;

[2] Minimum risk pesticides are pesticides that the United States Environmental Protection Agency has exempted from the Federal Insecticide, Fungicide, and Rodenticide Act requirements when used in a manner specified in section 152.25 of Title 40, Code of Federal Regulations.

coverage under the Vector Control Permit prior to application at, near, or over waters of the United States.

Notice of Applicability
Based on the information submitted in the application package, including the Notice of Intent and the Pesticide Application Plan dated May 03, 2016, the discharge as described below satisfies the conditions of the Vector Control Permit. Staff has deemed the application package complete and has assigned an enrollee number of 3 42AP00016. This Notice of Applicability implements regulatory coverage under the Vector Control Permit for the application described below, effective as of the date of this letter.

Discharge Description
Santa Barbara County is located in the southern portion of California, on the Pacific coast. The Mosquito and Vector Management District of Santa Barbara County services all of Santa Barbara County with the exception of the five Northern County Cities: Guadalupe, Santa Maria, Solvang, Buellton, and Lompoc. Some of the water bodies that the Mosquito and Vector Management District of Santa Barbara County treats for mosquito and vector control include regularly treated water bodies include: Andree Clark Bird Refuge, Atascadero Creek, Carpinteria Salt Marsh, Chumash Park (City of Pismo Beach), Devereux Lagoon, UC Santa Barbara Lagoon, Lake Los Cameros, North Beach Campground (Pismo State Beach), Oceano Dunes, Pismo Creek, Pismo Ecological Reserve (Pismo State Beach), San Pedro Creek, and Santa Barbara Airport Salt Marshes.

General Permit Requirements
To comply with the Vector Control Permit, the Mosquito and Vector Management District of Santa Barbara County shall:

a. Provide a copy of the Notice of Intent, the Pesticide Application Plan, and all other related materials to the aquatic pesticide applicators.
b. Ensure that all entities receiving regulatory coverage under this Notice of Applicability understand the terms and conditions of the permit.
c. Take all necessary steps to minimize or prevent pesticide spills, biological pesticide and chemical pesticide residue polluted water, and other pollutants from entering waters of the United States (in violation of permit requirements).
d. Review and update the effectiveness and adequacy of the control measures and best management practices (BMPs). Submit all changes to: (1) the BMPs proposed in the Notice of Intent, (2) the Pesticide Application Plan, or other provided information, to the State Water Board for review and comment.
e. Submit all information required in this Notice of Applicability and Vector Control Permit to the following address:

   State Water Resources Control Board
   Division of Water Quality
   Attention: Gil Vazquez
   1001 I Street, 15th Floor
   Sacramento, CA 95814

Discharge Monitoring and Reporting Requirements
To comply with the monitoring and reporting requirements of the Vector Control Permit, the Mosquito and Vector Management District of Santa Barbara County shall:

a. Timely inspect receiving waters, control measures, and BMPs to detect any conditions which may cause violations of the receiving water limitations and other requirements in the Vector Control Permit.
b. Conduct monitoring and reporting in compliance with the provisions and requirements in Monitoring and Reporting Program (Attachment C) of the Vector Control Permit.
c. Submit annual monitoring reports by March 1 of each year.
d. Include the following certification in all monitoring reports:

   "I certify under penalty of law that this document and all enclosures were prepared under my direction or supervision in accordance with a system designed to ensure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

If you have any questions regarding this Notice of Applicability or the Vector Control Permit, please contact Mr. Gil Vazquez in the NPDES Wastewater Unit of the Division of Water Quality at (916) 322-1400 or Gil.Vazquez@waterboards.ca.gov.

Sincerely,

Karen Larsen, Deputy Director
Division of Water Quality

cc: Pascal Mues
NPDES Permits Office
U.S. EPA Region 9, WTR-5
75 Hawthorne Street
San Francisco, CA 94105

John M. Robertson
Executive Officer
Central Coast Regional Water Quality Control Board

Sheila M. Soderberg, P.G.
Senior Engineering Geologist
Central Coast Regional Water Quality Control Board

Mosquito and Vector Management District of Santa Barbara County
Pesticide Application Plan (PAP)

1. **Description of ALL target areas, if different from the water body of the target area, in to which larvicides and adulticides are being planned to be applied or may be applied to control vectors. The description shall include adjacent areas, if different from the water body of the target areas**;

   The Mosquito and Vector Management District of Santa Barbara County (MVMD) services all of Santa Barbara County with the exception of the five Northern County Cities: Guadalupe, Santa Maria, Solvang, Buellton and Lompoc. In addition, the MVMD contracts with the City of Pismo Beach in San Luis Obispo County. Please see attachment A.

2. **Discussion of the factors influencing the decision to select pesticide applications for mosquito control;**

   In order to accomplish long-range, intelligent, and environmentally sound mosquito control, the management and manipulation of mosquitoes must be accomplished using not just one but all available pest control methods. This dynamic combination of methods into one thoughtful, ecologically-sensitive program is referred to as Integrated Pest Management (IPM). The District's mosquito control program employs IPM principles by first determining the species list and abundance of mosquitoes through larval and adult surveys and then using the most efficient, effective and environmentally sensitive means of control. In some situations, water management or source reduction programs can be instituted to reduce breeding areas. The District also considers biological control such as the planting of mosquito fish. When these approaches are not practical or otherwise appropriate, then a pesticide program is used so that specific breeding areas and/or adult mosquitoes can be treated. Although the MVMD is equipped to perform adulticiding as a means of chemical control we have not utilized this method in over twenty years. Our District focuses on larviciding when all other means of control have proven unsuccessful. In addition, we utilize the lowest toxicity larvicides available that have demonstrated efficacy in our environments.

   The MVMD utilizes the following components in their IPM strategy:
   - Public Education
   - Vector Surveillance
   - Disease Surveillance
   - Threshold Measures
   - Methods of Control
   - Continuing Education/Certification

Public Education

The MVMD utilizes an aggressive public education program to inform constituents of the ways in which they can help reduce the potential for breeding of nuisance and public health vectors. Presentations are given to schools, civic groups, homeowner associations, business entities and other public agencies. In addition the MVMD maintains a website with didactic materials which can be downloaded at the user's convenience. The MVMD also works with local organizations to mitigate breeding source issues through proper water and vegetation management.

Vector Surveillance

The MVMD has a well established surveillance program which targets larval and adult mosquito populations. Larval sources are routinely inspected by technicians in the field in addition to seeking out the location of new breeding sources. Technicians or the MVMD biologist will collect adult mosquito samples via overnight trapping both on a routine basis and as warranted by direct observation of adult abundance or through service requests from constituents.

Disease Surveillance

The MVMD maintains five sentinel chicken flocks throughout the District boundaries. Blood samples from these flocks are regularly tested for the presence of disease. In addition, adult mosquitoes are regularly collected and tested. The MVMD also participates in dead bird collection via the West Nile virus hotline maintained by the California Department of Public Health.

Threshold Measures

The MVMD utilizes the California Department of Public Health's Best Management Practices for Mosquito Control and the Mosquito-Borne Virus Surveillance and Response Plan to ascertain the appropriate action based on a number of factors including but not limited to: abundance, species, life stage, disease potential, range, distance to human populations, source size.

Control Methods

First and foremost the MVMD attempts to minimize the use of pesticides as a means of control. Pesticides are utilized as a last resort when all other methods have failed or are not feasible. The MVMD seeks to reduce breeding sources through physical and biological methods such as: debris and vegetation management, water quality improvements and biological control. Following these methods the MVMD will use insecticides that utilize a target specific bacterium to reduce mosquito populations in their larval form. These insecticides typically do not affect non-target species within the water body. Finally chemical control will be utilized when all other measures fail.

Continuing Education/Certification

All staff that interacts with pesticides at the MVMD are certified by the State of California Department of Public Health in all four vector control categories. In addition, regular

continuing education is provided to keep our staff apprised of changes and alternatives in vector management.

3. **Pesticide products or types expected to be used and if known, their degradation by-products, the method in which they are applied, and if applicable, the adjuvants and surfactants used;**

The following products may be used by the District for larval or adult mosquito control. This list is excerpted from Attachment E and F within the NPDES Permit for Biological and Residual Pesticide Discharges to Waters of the U.S. for Vector Control Applications. All of these products are used according to label directions and may be applied by ground (hand, truck, ATV, backpack, etc) or by air (helicopter or fixed wing aircraft).

List of Permitted Larvicide Products

Larvicide Product Name	Registration Number
Vectolex CG Biological Larvicide	73049-20
Vectolex WDG Biological Larvicide	73049-57
Vectolex WSP Biological Larvicide	73049-20
Vectobac Technical Powder	73049-13
Vectobac-12 AS	73049-38
Aquabac 200G	62637-3
Teknar HP-D	73049-404
Vectobac-G Biological Mosquito Larvicide Granules	73049-10
Vectomax CG Biological Larvicide	73049-429
Vectomax WSP Biological Larvicide	73049-429
Vectomax G Biological Larvicide/Granules	73949-429
Zoecon Altosid Pellets	2724-448
Zoecon Altosid Briquets	2724-375
Zoecon Altosid Liquid Larvicide Mosquito Growth Regulator	2724-392
Zoecon Altosid XR Entended Residual Briquets	2724-421
Zoecon Altosid Liquid Larvicide Concentrate	2724-446
Zoecon Altosid XR-G	2724-451
Zoecon Altosid SBG Single Brood Granule	2724-489
Mosquito Larvicide GB-1111	8329-72
BVA 2 Mosquito Larvicide Oil	70589-1

Larvicide Product Name	Registration Number
BVA Spray 13	55206-2
Agnique MMF Mosquito Larvicide & Pupicide	53263-28
Agnique MMF G	53263-30
Abate 2-BG	8329-71
5% Skeeter Abate	8329-70
Natular 2EC	8329-82
Natular G	8329-80
Natular XRG	8329-83
Natular XRT	8329-84
Natular T30	8329-85
FourStar Briquets	83362-3
FourStar SBG	85685-1
Aquabac xt	62637-1
Spheratax SPH (50 G) WSP	84268-2
Spheratax SPH (50 G)	84268-2

List of Permitted Adulticide Products

Adulticide Product Name	Registration Number
Pyrocide Mosquito Adulticiding Concentrate for ULV Fogging 7395	1021-1570
Evergreen Crop Protection EC 60-6	1021-1770
Pyrenone Crop Spray	432-1033
Prentox Pyronyl Crop Spray	655-489
Pyrocide Mosquito Adulticiding Concentrate for ULV Fogging 7396	1021-1569
Aquahalt Water-Based Adulticide	1021-1803
Pyrocide Mosquito Adulticide 7453	1021-1803
Pyrenone 25-5 Public Health Insecticide	432-1050
Prentox Pyronyl Oil Concentrate #525	655-471
Prentox Pyronyl Oil Concentrate or 3610A	655-501
Permanone 31-66	432-1250
Kontrol 30-30 Concentrate	73748-5
Aqualuer 20-20	769-985
Aqua-Reslin	432-796

Adulticide Product Name	Registration Number
Aqua-Kontrol Concentrate	73748-1
Kontrol 4-4	73748-4
Biomist 4+12 ULV	8329-34
Permanone RTU 4%	432-1277
Prentox Perm-X UL 4-4	655-898
Allpro Evoluer 4-4 ULV	769-982
Biomist 4+4	8329-35
Kontrol 2-2	73748-3
Scourge Insecticide with Resmethrin/Piperonyl Butoxide 18%+54% MF Formula II	432-667
Scourge Insecticide with Resmethrin/Piperonyl Butoxide 4%+12% MF Formula II	432-716
Anvil 10+10 ULV	1021-1688
AquaANVIL Water-based Adulticide	1021-1807
Duet Dual-Action Adulticide	1021-1795
Anvil 2+2 ULV	1021-1687
Zenivex E20	2724-791
Trumpet EC Insecticide	5481-481
Fyfanon ULV Mosquito	67760-34

4. Description ALL of the application areas and the target areas in the system that are being planned to be applied or may be applied. Provide a map showing these areas;

Any site that holds water for more than 96 hours (4 days) can produce mosquitoes. Source reduction is the MVMD's preferred solution, and whenever possible the agency works with property owners to affect long-term solutions to reduce or eliminate the need for continued applications as described in Item 2 above. Mosquito breeding sources and areas that require adult mosquito control are difficult to predict from year to year based on the weather and variations in local environmental conditions. However, the typical sources treated by this agency include:

Please refer to map provided in Item 1 above; regularly treated water bodies include:

1. Andree Clark Bird Refuge
2. Atascadero Creek
3. Carpinteria Salt Marsh
4. Chumash Park (City of Pismo Beach)

5. Cienguitas Creek
6. Devereux Lagoon
7. Lake Los Carneros
8. Mission Creek
9. Pismo Creek
10. Tecolote Creek
11. Santa Barbara Airport salt marshes

5. Other control methods used (alternatives) and their limitations;

With any source of mosquitoes or other vectors, the MVMD's first goal is to look for ways to eliminate the source, or if that is not possible, for ways to reduce the potential for vectors. The most commonly used methods and their limitations are included in the Best Management Practices for Mosquito Control in California.

Specific methods used by the agency include stocking mosquito fish (*Gambusia affinis*), educating residents that mosquitoes develop in standing water and encouraging them to remove sources of standing water on their property, and working with property owners to find long-term water management strategies that meet their needs while minimizing the need for public health pesticide applications.

6. How much product is needed and how this amount was determined;

The need to apply product is determined by surveillance. Actual use varies annually depending on mosquito abundance. The pesticide amounts presented below were taken from the MVMD's 2015 NPDES Annual Report. Other public health pesticides in addition to those listed below may be used as part of the agency's best management practices.

Product	Registration Number	Total Amount (lbs.)	Number Applications
Altosid Briquets	2724-375	12.0119	2
Altosid Pellets	2724-448	100	4
Altosid XR Briquets	2724-421	637.56	5
VectoBac G	73049-10	5488.802	767
VectoLex FG	73049-20	70	1
Natular T30	8329-85	24.611	15
Natular XRT	8329-84	8.272	33

7. **Representative monitoring locations and the justification for selecting these monitoring locations**

   Please see the MVCAC NPDES Coalition Monitoring Plan.

8. **Evaluation of available BMPs to determine if there are feasible alternatives to the selected pesticide application project that could reduce potential water quality impacts; and**

   The MVMD utilizes BMP criteria as stated in the Best Management Practices for Mosquito Control in California. In summary the MVMD utilizes the criteria listed in item #2 above.

9. **Description of the BMPs to be implemented. The BMPs shall include at a minimum:**

   The MVMD's BMPs are described in Item 2 above. Specific elements have been highlighted below under items a-f:

   a. **measures to prevent pesticide spill;**

      All pesticide applicators receive annual spill prevention and response training. Agency employees ensure daily that application equipment is in proper working order. Spill mitigation devices are placed in all vehicles and pesticide storage areas.

   b. **measures to ensure that only a minimum and consistent amount is used**

      Application equipment is calibrated at least annually as required by the California Department of Pesticide Regulation (DPR) and the terms of a cooperative agreement with the California Department of Public Health (CDPH).

   c. **a plan to educate Coalition's or Discharger's staff and pesticide applicator on any potential adverse effects to waters of the U.S. from the pesticide application;**

      This will be included in our pesticide applicators annual pesticide application and safety training, continuing education programs, and/or regional NPDES Permit training programs.

   d. **descriptions of specific BMPs for each application mode, e.g. aerial, truck, hand, etc.;**

      The MVMD calibrates truck-mounted and handheld larviciding equipment each year to meet application specifications. Supervisors review application records daily to ensure appropriate amounts of material are being used. Ultra-low volume (ULV) application equipment is calibrated for output and droplet size to meet label requirements. Aerial larviciding equipment is calibrated by the Contractor. Aerial

adulticide equipment is calibrated regularly and droplet size will be monitored by the agency to ensure droplets meet label requirements. Airplanes used in urban ULV applications and the primary airplane used for rural ULV application is equipped with advanced guidance and drift management equipment to ensure the best available technology is being used to place product in the intended area. If a secondary airplane is used in rural ULV applications it will be equipped with an advanced guidance system.

e. descriptions of specific BMPs for each pesticide product used; and

Please see the Best Management Practices for Mosquito Control in California for general pesticide application BMPs, and the current approved pesticide labels for application BMPs for specific products.

f. descriptions of specific BMPs for each type of environmental setting (agricultural, urban, and wetland).

Please see the Item 2 above

The following environmental settings are of interest to the MVMD, BMPs for each can be found in the Best Management Practices for Mosquito Control in California:

- Residential and Landscaped Properties
- Rural Properties
- Wetlands
- Stormwater Management
- Right of Ways and Easements
- Wastewater Treatment Facilities
- Wildlands and Undeveloped Areas

10. Identification of the problem. Prior to first pesticide application covered under this General Permit that will result in a discharge of biological and residual pesticides to waters of the US, and at least once each calendar year thereafter prior to the first pesticide application for that calendar year, the Discharger must do the following for each vector management area:

a. If applicable, establish densities for larval and adult vector populations to serve as action threshold(s) for implementing pest management strategies;

The MVMD staff only applies pesticides to sources of mosquitoes that represent imminent threats to public health or quality of life. The presence of any mosquito may necessitate treatment, however higher thresholds may be applied depending on the agency's resources, disease activity, surveillance data, or local needs. Treatment thresholds are based on a combination of one or more of the following criteria:

- Mosquito species present
- Mosquito stage of development
- Pest, nuisance, or disease potential
- Disease activity
- Mosquito abundance
- Flight range
- Proximity to populated areas
- Size of source
- Presence/absence of natural enemies or predators
- Presence of sensitive/endangered species or habitats.

b. Identify target vector species to develop species-specific pest management strategies based on developmental and behavioral considerations for each species;

Please see Item 2 above.

Specific species of concern for the MVMD are:

- *Culex tarsalis*
- *Culex quinquefasciatus*
- *Culex erythrothorax*
- *Aedes squamiger*
- *Culiseta incidens*
- *Culiseta inornata*
- *Anopheles hermsi*
- *Anopheles franȏiscanus*
- *Aedes washinoi*
- *Culiseta particeps*
- *Aedes taeniorhynchus*

c. Identify known breeding areas for source reduction, larval control program, and habitat management; and

Any site that holds water for more than 96 hours (4 days) can produce mosquitoes. Source reduction is the agency's preferred solution, and whenever possible the agency works with property owners to implement long-term solutions to reduce or eliminate the need for continued pesticide applications as described in Item 2 above.

d. Analyze existing surveillance data to identify new or unidentified sources of vector problems as well as areas that have recurring vector problems.

This is provided in the Item 2 above that the agency uses. The MVMD continually collects adult and larval mosquito surveillance data, dead bird reports, and sentinel chicken test results, and monitors regional mosquito-borne disease activity detected in humans, horses, birds, and/or other animals, and uses these data to guide mosquito control activities.

11. Examination of Alternatives. Dischargers shall continue to examine alternatives to pesticide use in order to reduce the need for applying larvicides that contain temephos and for spraying adulticides. Such methods include:

a. Evaluating the following management options, in which the impact to water quality, impact to non-target organisms, vector resistance, feasibility, and cost effectiveness should be considered:

- No action
- Prevention
- Mechanical or physical methods
- Cultural methods
- Biological control agents
- Pesticides

If there are no alternatives to pesticides, dischargers shall use the least amount of pesticide necessary to effectively control the target pest.

The MVMD uses the principles and practices of Integrated Vector Management (IVM) as described on pages 26 and 27 of the Best Management Practices for Mosquito Control in California and as discussed in item 2 above. As stated in item #10 above, locations where vectors may exist are assessed, and the potential for using alternatives to pesticides is determined on a case-by-case basis. Commonly considered alternatives include: 1) Eliminate artificial sources of standing water; 2) Ensure temporary sources of surface water drain within four days (96 hours) to prevent adult mosquitoes from developing; 3) Control plant growth in ponds, ditches, and shallow wetlands; 4) Design facilities and water conveyance and/or holding structures to minimize the potential for producing mosquitoes; and 5) Use appropriate biological control methods that are available. Additional alternatives to using pesticides for managing mosquitoes are listed on pages 4-19 of the Best Management Practices for Mosquito Control in California (See previous comment.).

Implementing preferred alternatives is dependent on a variety of factors including availability of agency resources, cooperation with stakeholders, coordination with other regulatory agencies, and the anticipated efficacy of the alternative. If a pesticide-free alternative does not sufficiently reduce the risk to public health, pesticides are considered, beginning with the least amount necessary to effectively control the target vector.

b. Applying pesticides only when vectors are present at a level that will constitute a nuisance.

The MVMD follows an existing IVM program, which includes practices described in the Item 2 above.

A "Nuisance" is specifically defined in California Health and Safety Code (HSC) §2002(j). This definition allows vector control agencies to address situations where even a low number of vectors may pose a substantial threat to public health and quality of life. In practice, the definition of a "nuisance" is generally only part of a decision to apply pesticides to areas covered under this permit. As summarized in the California Mosquito-borne Virus Surveillance and Response Plan, the overall risk to the public when vectors and/or vector-borne disease are present is used to select an available and appropriate material, rate, and application method to address that risk in the context of our IVM program.

12. Correct Use of Pesticides

Coalition's or Discharger's use of pesticides must ensure that all reasonable precautions are taken to minimize the impacts caused by pesticide applications. Reasonable precautions include using the right spraying techniques and equipment, taking account of weather conditions and the need to protect the environment.

This is an existing practice of the MVMD, and is required to comply with the Department of Pesticide Regulation's (DPR) requirements and the terms of our California Department of Public Health (CDPH) Cooperative Agreement. All pesticide applicators receive annual safety and spill training in addition to their regular continuing education.

13. If applicable, specify a website where public notices, required in Section VIII.B, may be found.

http://www.mvmdistrict.org

References:

Best Management Practices for Mosquito Control in California. 2011. Available by download from the California Department of Public Health—Vector-Borne Disease Section at http://www.westnile.ca.gov/resources.php under the heading *Mosquito Control and Repellent Information*. Copies may be also requested by calling the California Department of Public Health—Vector-Borne Disease Section at (916) 552-9730 or the Mosquito and Vector Management District of Santa Barbara County at (805) 969-5050.

California Mosquito-borne Virus Surveillance and Response Plan. 2010. [Note: this document is updated annually by CDPH]. . Available by download from the California Department of Public Health—Vector-Borne Disease Section at http://www.westnile.ca.gov/resources.php under the heading *Response Plans and Guidelines*. Copies may be also requested by calling the California Department of Public Health—Vector-Borne Disease Section at (916) 552-9730 or the Mosquito and Vector Management District of Santa Barbara County at (805) 969-5050.

MVCAC NPDES Coalition Monitoring Plan. 2011. [In development at the time of this draft]

Appendix C

Goleta Slough Ecosystem Biological Technical Report

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1 Goleta Slough Ecosystem Biological Technical Report

This Biological Technical Report describes environmental impacts on coastal resources from the Mosquito and Vector Management District of Santa Barbara County (District) surveillance and treatment activities occurring within the Goleta Slough, a coastal ecosystem in southern Santa Barbara County. The Goleta Slough Ecosystem Management Plan (GSEMP; GSMC 2015) depicts the boundaries of the slough, and the illustrated boundaries comprise the Study Area for biological resources evaluated in this report. The Study Area is depicted on Figure 1. The surveillance and treatment activities are described in the Integrated Mosquito and Vector Management Plan (IMVMP, or "Plan") Section 2, Integrated Mosquito Management Program, and include Special Coastal Procedures for minimizing environmental impacts in coastal areas.

The GSEMP includes areas within the Santa Barbara Airport (SBA), City of Goleta, and University of California Santa Barbara (UCSB), and extends into unincorporated Santa Barbara County near Atascadero and San Pedro creeks and More Mesa. The GSEMP area includes the airport, the historical extent of the Goleta Slough and its surrounding wetland, riparian, and beach habitats, Goleta Beach County Park and More Mesa as described in the GSEMP. The GSEMP Study Area is within the *Goleta, California* United States Geological Survey (USGS) 7.5-minute topographic quadrangle. The GSEMP is surrounded by the Santa Ynez Mountains to the north, Pacific Ocean to the south, City of Santa Barbara to the east, and developed areas of the Goleta Valley to the west.

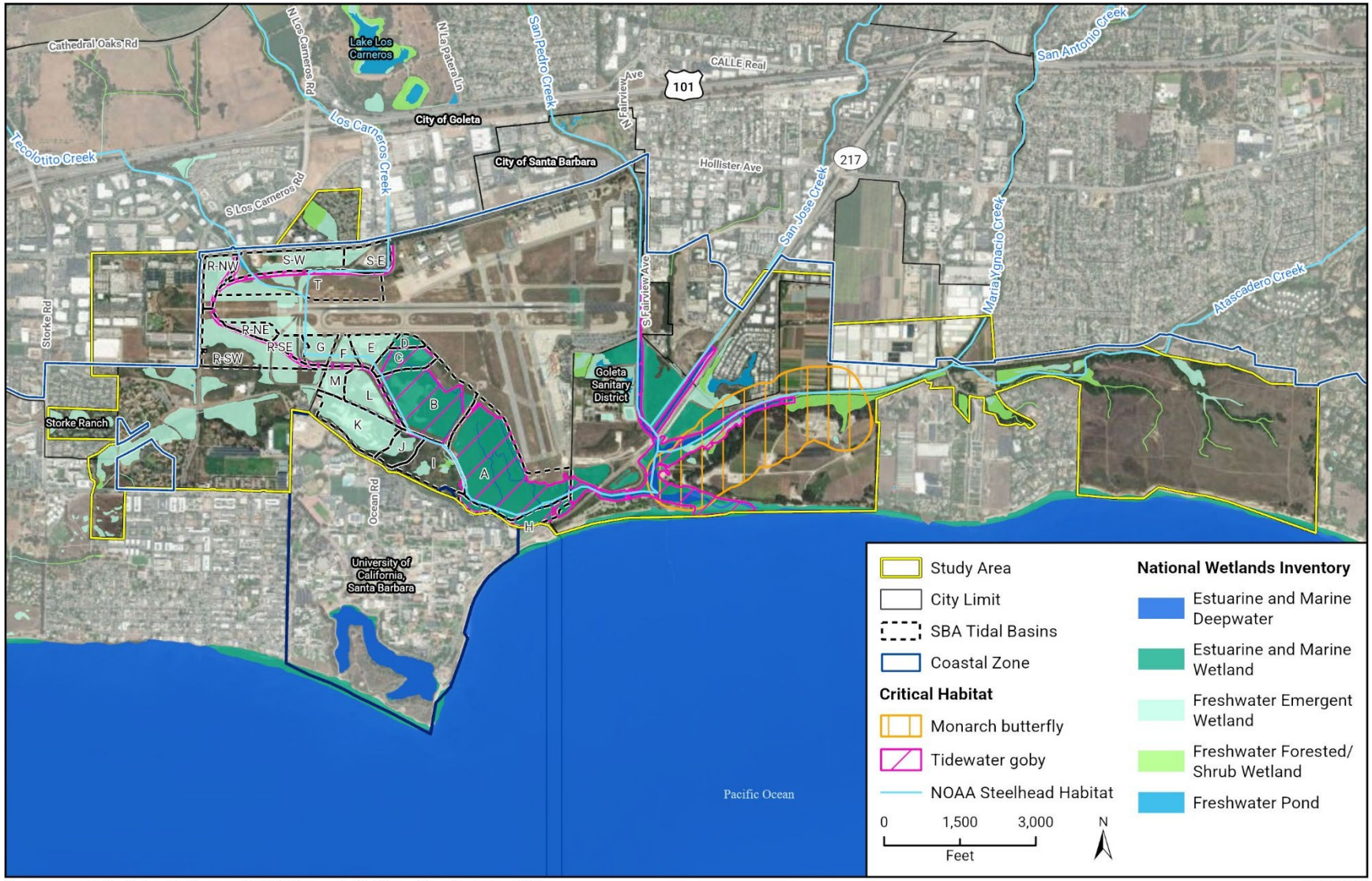
The Goleta Slough is a large wetland and ecological reserve owned in part by the City of Santa Barbara, California Department of Fish and Wildlife (CDFW), and UCSB. The Goleta Slough receives water from six major streams; Atascadero, San Pedro, Maria Ygnacio, and San Jose creeks meet near the mouth of the Goleta Slough on the east side, while Los Carneros and Tecolotito creeks meet upstream to the west. The lower reaches of all these creeks have been subject to regular management actions (including silt removal projects), and structures such as check dams, concrete lining, and sediment basins are present. Tecolotito and Los Carneros creeks had channel realignment projects implemented in 2006 and tidal Basins E/F were restored in 2010 (URS Corporation 2008, Padre 2010).

While not part of the Study Area, the Carpinteria Salt Marsh is depicted under Figure 2 since it is subject to similar surveillance and treatment activities by the District, including the Special Coastal Procedures, and contains resources similar to those found in Goleta Slough.

1.1 Goleta Slough Environmental Setting

The Goleta Slough is in southern Santa Barbara County between the Santa Ynez Mountains and the Pacific Ocean. The 2,250-acre Goleta Slough ecosystem area was identified by the Goleta Slough Management Committee (GSMC) in the mid-1990s. The primary determinant of what to include in the ecosystem was whether an area was historically within the tidally influenced basin of the Goleta Slough, although contiguous freshwater wetland habitats and upland habitats were also included. The ecosystem is mostly in the coastal zone including the Goleta Slough and portions of the six creeks that drain into it (Figure 1).

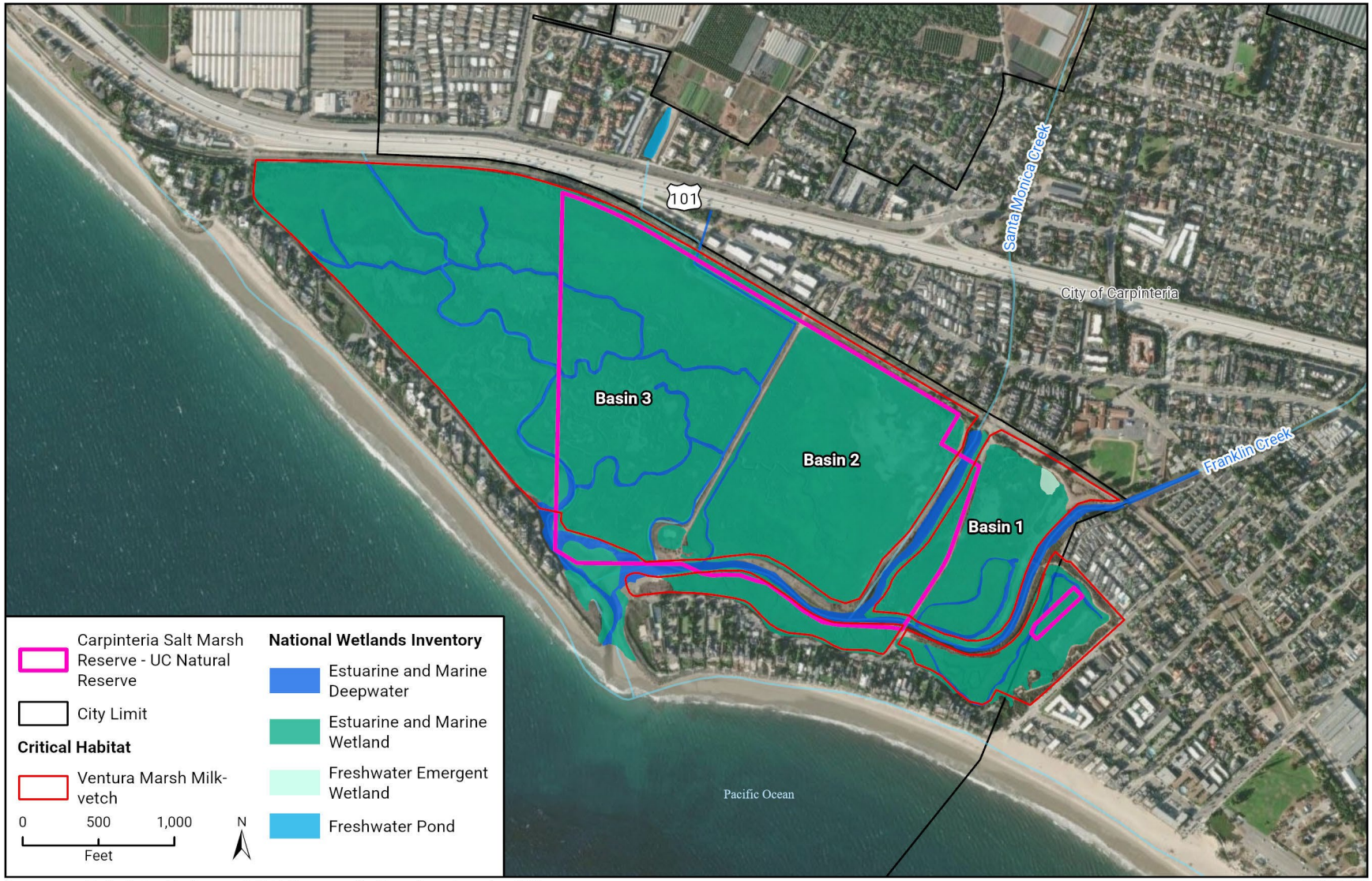
Figure 1 Goleta Slough Treatment Areas and Critical Habitat



Basemap provided by Esri and its licensors © 2026. Map created by Rincon Consultants, Inc., 2026.

25-18350 BIO
Tidewater Goby and Steelhead Figure

Figure 2 Carpinteria Salt Marsh Treatment Areas and Critical Habitat



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25-18350 BIO
Carpinteria Salt Marsh

The Goleta Slough is the northernmost example of a large southern California estuary and represents the northern limit of distribution for several plant and animal species (GSMC 2015). It includes the Goleta Slough Ecological Reserve and the Goleta Slough State Marine Conservation Area, both of which are managed by the CDFW. In addition to its biological importance, the Goleta Slough provides many other functions and values including floodwater storage capacity, filtering of pollutants contained in stormwater runoff, open space, and educational and scientific opportunities. The area is also rich in cultural and historic resources. The Goleta Slough is designated an Environmentally Sensitive Habitat Area (ESHA) in planning documents, as are most of the creeks that drain into it. The Goleta Slough's watershed is about 45 square miles and includes the drainages of six creeks: Atascadero, Carneros, Maria Ygnacio, San Jose, San Pedro, and Tecolotito (Figure 1).

The Goleta Slough was historically an embayment of approximately 18 square miles in size. The name *Goleta* means schooner in Spanish, reflecting the history of the area when the Goleta Slough was a bay with boats sailing inland close to what is now Hollister Avenue. The Goleta Slough and surrounding areas were historically occupied by the Chumash people and supported several Chumash settlements due to the abundance of freshwater, estuarine, and marine resources. Archaeological sites within and adjacent to the Goleta Slough provide evidence of long-term Native American use of the area (Modugno 2021).

The 2,250-acre GSEMP area was identified by the GSMC in the mid-1990s. The primary determinant of what to include in the ecosystem was if an area was historically within the tidally influenced basin of the Goleta Slough. Contiguous freshwater wetland habitats and upland habitats were also included. The ecosystem includes the Goleta Slough and portions of the six creeks that drain into it. Much of the area lies within the coastal zone. Some of the GSEMP area is developed with urban uses, including the SBA, Goleta Sanitary District (GSD) plant, Goleta West Sanitary District (GWSD) plant, multifamily housing, and commercial and industrial uses.

1.2 District Activities

An essential component of an effective and environmentally sensitive IMVMP is the District's proactive approach to the management of vector populations. Continuous surveillance, early detection, a rapid response, and a good public education program to minimize human and vector interactions. Most importantly, a proactive approach minimizes the use of pesticides while maximizing the opportunities to use methodologies that are the least disruptive to non-target organisms and the environment.

Without implementation of proactive or coordinated abatement measures, mosquito abundance in the GSEMP would result in:

- Elevated mosquito nuisance conditions affecting nearby residential areas, UCSB Main Campus, and airport operations
- Increased public health risk and potential for a public health emergency associated with mosquito-borne disease transmission to humans and wildlife, particularly during warm months when viral amplification is greatest

The District has existing management plans and a memorandum of understanding for the selected treatment areas in the GSEMP described below. This list is not inclusive since the District treats multiple areas in the Study Area habitats shown on Figure 1. Proactive surveillance and treatment greatly reduce the potential for public health emergency responses, which may have more severe environmental and public health consequences.

1.2.1 City of Santa Barbara Airport

These basins on the SBA property described under Table 1 are recognized as larval habitats that serve as sources of nuisance and disease-vector mosquitoes.

Table 1 Santa Barbara Airport Treatment Areas

SBA Basin	District Name	Treatment Area	National Wetland Inventory Habitat (NWI) Classification
A	Main Basin	Near radar installation area and adjacent to State Route 217	Tidal marsh
B, C, D	Middle Basin	Middle Basin (located to the northeast of and adjacent to Area L/M)	Tidal marsh
E	East of Panama Basin	SBA restored tidal basin. Tidal and freshwater.	Freshwater marsh (restored to tidal since NWI mapping)
F	Panama Basin	SBA restored tidal basin	Freshwater marsh (restored to tidal since NWI mapping)
G	West of Panama Basin	Tidal and freshwater basin west of "Panama" basin.	Freshwater marsh
H	SR 217 Source	Tidal treatment area	Tidal Marsh
I	White Pole	Field north of UCSB's Laundry Road	Freshwater marsh
J	Tule Pond	Tule Pond	Freshwater pond
K	Duck Pond	Duck Pond, channel on south side of Duck Pond	Freshwater marsh
L/M	Triangle Basin	Freshwater marsh	Freshwater marsh
R	Runways, Chumash field, No go Zone, Field West of West Basin	Freshwater marsh area southwest of the main runway, southwest from the west end of the main runway, on both sides of Tecolote Creek, field near radar Installation	Freshwater marsh
S	Hollister Sources, plant nursery	Wetland south of Hollister Ave. near Los Carneros Rd, Ditch on the south side of Hollister Ave	Riparian corridor
T	Mowed Field	Freshwater areas	Freshwater marsh

The District accesses treatment locations using 4x4 vehicles on existing maintained roads within the SBA. Due to security as well as ecological concerns, access within the SBA is very limited and is granted through a pre-approved airport security badge requirement. Technicians have badges and are required to notify SBA in advance of access and must check in and out with SBA staff each time they access the property. The District does not own or maintain roads and relies on SBA, utility, or Santa Barbara County Flood Control District (SBCFCD) roads. Some locations require additional walking to reach specific treatment locations, depending on road maintenance. Once at the treatment location, treatments are conducted on foot within the basins. Hip wading boots are typically worn when accessing and treating the various basins and ponds when they are flooded. Some locations require an escort for safety and security due to proximity to airplane runways.

The existing roads were developed for airport use in the 1940s, including the original road to Goleta Beach and before State Route (SR) 217 to UCSB was constructed. Since the 1940s, regional infrastructure has been added to SBA property, including flood control levees and berms, SR 217, and above and below ground utilities including water, sewer, telephone, cable, electricity, and internet lines. The District is coordinating with SBA to re-establish vegetation management on existing berms and roads.

All pesticides used at SBA by the District are approved by and registered with the California Department of Pesticide Regulation (CDPR) and United States Environmental Protection Agency (USEPA) as discussed above, and are and in compliance with the City of Santa Barbara's Integrated Pest Management Strategy as well as the State Water Resources Control Board's (SWRCB) Vector Management Permit for use in Waters of the United States (City of Santa Barbara 2006, 2023; SWRCB 2016). The District only uses material designated in the green or yellow category as defined in the

Integrated Pest Management Strategy, consistent with Best Management Practice (BMP)-04. The District notifies the SBA prior to treatment**,** and qualified biologists monitor the surrounding habitat during treatment in the Goleta Slough. While monitoring, the biologists make observations and provide verbal notifications of resources to be avoided.

1.2.2 University of California Santa Barbara

UCSB has considerable acreage of natural lagoons, estuaries, vernal pools, seasonal and permanent freshwater ponds, constructed water features (ornamental ponds, fountains, and drains), bioswales and other wetlands that are significant sources. Boats may be used to apply larvicides at large bodies of water such as Devereux Slough.

Approximately 10.8 acres of treated areas occur within the Study Area which includes freshwater wetlands and freshwater management features, including seasonally flooded marshes, bioswales, vernal pools, ponds, and stormwater infrastructure. Coastal or brackish habitat treated on the UCSB Campus are outside the Study Area and limited to the lagoon-adjacent wetlands along the Campus Lagoon shoreline and the Devereux Slough.

1.2.3 Storke Ranch

Storke Ranch Wetland, historically the southwestern extension of Goleta Slough, has been cut off by berms, drainage ditches, and tide gates (Cheadle Center for Biodiversity and Ecological Restoration [CCBER] 2026). The Storke Ranch Wetland is not in the GSEMP but was added to the study area since it is a notorious source of mosquitoes and is hydrologically connected to the GSEMP and Devereux Slough. The Storke Ranch Development was constructed during the early 2000s, and the Development Plan required a comprehensive Environmental Management Plan (Van Atta Associates 1999), including environmentally sensitive mosquito management under Development Plan Condition of Approval #28:

> *The marshes and vernal pools shall not be drained. Control of mosquitoes and other pests in these areas shall only occur in consultation with the Goleta Valley Vector Control District and shall use the most environmentally sensitive agent which provides effective control as determined by the District.*
>
> *Plan Requirements and Timing: The applicant and the Goleta Valley Vector Control District shall be encouraged to enter into an agreement plan concerning monitoring, record keeping, use of approved pesticides, and limitations concerning draining vernal pools.*

The treatment area includes three basins of between 0.8 acre and 2.5 acres that form a seasonal wetland that collects runoff rainwater. Depending on the amount of winter rainfall, the wetland may remain flooded for several months. Floodwater mosquitoes hatch out immediately after the basins fill with rainwater. Later in the season, *Culex, Culiseta*, and *Anopheles* mosquito species will breed there. In 2025/2026, approximately 13 visits are assumed, and 22 pounds of VectoBac G and less than a pound of VectoMax are anticipated to be used. The number of visits and amount of treatment varies annually depending on flooded acreage.

1.2.4 Goleta Sanitary District

The Goleta Sanitary District's (GSD) wastewater treatment facility has two large mosquito breeding sources on its property. The main source is a wetland at Moffett Place and Fowler Road that consists of a pair of tule-filled freshwater marshes. This 6.5-acre site is a seasonal wetland that floods during winter rainstorms. Dense tule vegetation, which provides an excellent habitat for mosquito breeding, grows throughout the entire wetland except for the southwest corner which has a dense growth of willows.

Floodwater mosquitoes breed in this wetland and their eggs hatch as the wetland floods. The adult females are not known to be disease vectors but are vicious and aggressive biters that cause serious mosquito nuisance problems. Floodwater mosquitoes have only one generation per year and can be controlled with a pre-flood treatment of time-released larvicide applied before flooding occurs. Altosid 30-

day briquettes (47 pounds estimated) are the most effective and efficient way to treat this site for Floodwater mosquitoes due to its 30-day time release formulation and are applied using slingshots either before or after it floods.

The secondary source is three freshwater settling ponds on the east side of the GSD facility. Vegetation growing in the stagnant water plus the effluent in these ponds can create ideal mosquito breeding habitats, especially when vegetation starts growing in the ponds and creates refuges for mosquito larvae. The total area of the ponds is approximately 5.5 acres, of which about 2.5 acres the District has traditionally treated. Because of the sporadic nature of mosquito breeding in this habitat, it is treated only upon request by the GSD.

1.3 Resource Management

State, federal and local agencies regulate development, execute restoration, and conduct or oversee research activities within the Plan area. Regulatory agencies include the Federal Aviation Administration, United States Army Corps of Engineers (USACE), United States Fish and Wildlife Service (USFWS), state and regional water quality control boards, CDFW, State Lands Commission, National Marine Fisheries Service (NMFS), and the California Coastal Commission (CCC). Special districts, such as the Santa Barbara Flood Control District, also conduct activities in the Goleta Slough. Other special districts operating in the Goleta Slough are two sanitary districts GSD and GWSD and the Goleta Water District. Land use permitting authority includes the CCC, City of Santa Barbara, City of Goleta, or County of Santa Barbara depending on the location.

Most of the Goleta Slough Ecosystem is located within the coastal zone. The CCC retains original permit jurisdiction over “tidelands, submerged lands, public-trust lands,” and has appeal authority over local Coastal Development Permit (CDP) decisions in certain zones. The CCC retains “original permit jurisdiction” over portions of the Goleta Slough itself and along tidally influenced portions of Atascadero and San Jose creeks.

1.3.1 Goleta Slough Management Committee

The GSMC was established in 1991 in recognition of the importance of the Goleta Slough and the challenge of managing it comprehensively. SBA is required to support the financing of a GSMC Facilitator who works to bring together all stakeholders on a regular basis to discuss management activities, proposed projects, and resilience strategies.

No single entity has management authority over the entire Goleta Slough area, but a number of agencies play a major role in the area, including the cities of Goleta and Santa Barbara, the County of Santa Barbara, several special districts, UCSB, and several state and federal regulatory agencies. GSMC was formed to work cooperatively with regulatory agencies, property owners, and public interest groups to provide for a healthy ecosystem irrespective of jurisdictional or other boundaries. GSMC continues to identify and resolve issues related to management of the GSEMP and serves in an advisory capacity to lead agencies (e.g., City of Goleta, City of Santa Barbara, Santa Barbara County, and University of California Regents) (GEMC 2016). GSMC serves as a forum to review projects that involve property owners, sensitive habitats, interested parties and multiple jurisdictions. Information is provided to stakeholders via bi-monthly newsletter and meetings that allow for GSMC members to determine whether they will individually support proposed activities or projects in the GSMC area.

1.3.2 California Department of Fish and Wildlife

Goleta Slough Ecological Reserve

In 1988, CDFW (then known as the California Department of Fish and Game) prepared a draft management plan for the Goleta Slough Ecosystem. This plan initially named the sub-areas or basins within the Goleta Slough. The plan was never finalized but the lettering system for the sub-basins is still used today (as shown in Figure 1). The Goleta Slough Ecological Reserve protects 440 acres of a variety of habitat types, including estuarine, riverine, and palustrine wetlands; coastal bluff scrub; introduced grassland; coastal sage scrub; and southern coastal oak woodland.

Mosquito control on state lands is guided by *Best Management Practices for Mosquito Control on California State Properties* (California Department of Public Health [CDPH] 2008), which provides property owners and land managers with BMPs to control and reduce mosquito populations.

Goleta Slough State Marine Conservation Area

In 2007, approximately 160 acres were named the Goleta Slough State Marine Conservation Area located below the mean high tide line (4.51 feet above mean sea level). This area is designated a “no take” zone, where no marine life may be taken or caught and boating, swimming, wading, and diving are prohibited. The District is allowed to enter the State Marine Conservation Area for the purposes of carrying out official duties (California Code of Regulations Title 14, Section 632).

1.3.3 Local Coastal Programs

City of Santa Barbara Airport Local Coastal Program

The City of Santa Barbara has a certified Local Coastal Program (LCP) covering the airport and Goleta Slough. This plan, originally certified in 1982, was updated in 2003 to incorporate the GSEMP.

An Airport Zoning Ordinance adopted in 1974 established the Goleta Slough as a protected natural wildlife area, prohibiting any alterations not directly intended for preservation or enhancement of its natural condition. Additional protection is provided to sensitive environmental resources at SBA within the coastal zone through the City of Santa Barbara’s zoning ordinance. Much of the airport lies within the S-D-3 Coastal Overlay Zone, where City of Santa Barbara-issued CDPs remain appealable to the CCC.

The Santa Barbara City Code Airport Zoning Code (Section 29.25.040.A.4) specifically exempts ongoing mosquito abatement and related maintenance activities from requiring a Goleta Slough CDP.

Like the Coastal Act, Section 29.25.030 lists the uses permitted in the coastal zone subject to a Goleta Slough CDP and include incidental public service projects and repair or maintenance activities. Uses allowed without a Goleta Slough CDP include mosquito abatement activities, public access for educational purposes, and the maintenance of cultural resources.

Development at SBA includes three review paths:

- Exemptions/Exclusions (ministerial review)
- City of Santa Barbara-issued CDPs (Staff Hearing Officer or Planning Commission)
- CCC-issued CDPs (when within retained jurisdiction or on appeal)

County of Santa Barbara Local Coastal Program and Eastern Goleta Valley Community Plan

The western portion of the GSEMP is under the jurisdiction of the County. In 1982, the County’s LCP was certified. In 1993, the Goleta Valley Community Plan provided further protection through the creation of specific policies and development standards regulating land use. The Goleta Community Plan was

replaced with the Eastern Goleta Valley Community Plan, certified in 2017. The County's LCP and Eastern Goleta Valley Community Plan designates Environmentally Sensitive Habitat Areas (ESHA) but does not include specific standards relating to vector management or pesticide use.

UCSB Long Range Development Plan

UCSB has a Long Range Development Plan certified by the CCC in 2014 and includes buffers and management measures that are required to protect ecological integrity and special-status species. Approximately 237 acres of campus land are designated as ESHA. Policy ESH-10 regulates mosquito control in ESHA.

City of Goleta General Plan/Coastal Land Use Plan Conservation Element

The City of Goleta, incorporated in 2002, has adopted a General Plan/Coastal Land Use Plan (referred to as the "GP/CLUP"), but the latter is in the process of consultation with the CCC and is not certified.

The Goleta GP/CLUP includes policies that protect and preserve biological resources by designating specific resources and areas as protected, including ESHAs, restricting activities and uses in protected areas, providing for the management of the resources on City of Goleta lands, specifying impact avoidance and mitigation requirements for types of activities and by type of biological resource, and providing guidance for development and conservation decisions over the long term. Natural resources are regulated and protected through the Conservation Element, which contains policies aimed at protecting ESHAs that are generally mapped in Figure 4.1 of the GP/CLUP.

1.4 Ecological Setting

The primary source for description below is the 2015 GSEMP supplemented with the studies and project specific biological reports.

1.4.1 Ecological History

Historically the Goleta Slough supported 1,800 acres of tidal salt marsh, but the site has been degraded and reduced in size through both natural sedimentation and artificial filling. Both natural and anthropogenic processes have contributed to a reduction in tidal circulation within the Goleta Slough. During this century, approximately 60 percent of the tidal wetlands in the Goleta Slough have been lost (filled) or isolated from tidal action (CCC 2019). Nearly 100 years ago, for cattle grazing purposes, berms were constructed across the Goleta Slough to keep out salt water. Ditches were constructed to drain rainwater runoff into the remaining Goleta Slough to the east and a tide gate was added to keep the salt water out. Ever since then, the Goleta Slough's ecological function has declined, and roads and housing were constructed on-site. In addition, the watershed in and around the western part of the Goleta Slough has become increasingly impermeable and water flow from there has been channelized into storm drains that empty directly into wetlands. In some cases, those wetlands retain high ecological function, and in other cases, drainage features such as channels and ditches have reduced wetland functionality by altering natural hydrology, sediment processes, and habitat conditions (CCBER 2026).

The Marine Corps Air Station, built in 1941, eventually became the Santa Barbara Municipal Airport and portions of UCSB (CCC 2019). The Goleta Slough has also been extensively modified to accommodate several substantial developments and is now the site of the SBA, two wastewater treatment facilities (GWSD and GSD), and has other commercial and industrial uses. Historically, the Goleta Slough was a permanently flooded estuarine embayment, but tidal gates installed in the 1950s prevent the entirety of the site from being tidally influenced. Approximately 100 acres of the Goleta Slough consist of small basins isolated from tidal circulation by berms and/or culverts.

The existing roads were developed for airport use in the 1940s, including the original road to Goleta Beach and UCSB before SR 217 was constructed. Levees and flood control infrastructure, and utilities easements including water, sewer, telephone, cable, electricity, and internet now cross SBA property.

Prior to the 1975 Goleta Slough Management Plan, the SBCFCD had:

- Installed sediment/debris basins at Glen Annie and Carneros Creeks
- Conducted channel widening and deepening to restore conveyance and enhance tidal flushing
- Removed or modified certain levees and culverts to improve saltwater circulation

These actions inadvertently reduced mosquito habitat by decreasing stagnant-water conditions and increasing tidal reach (Hannan 1975).

District Management History

The Isla Vista Mosquito Abatement District was formed in 1959 (renamed the Goleta Valley Mosquito Abatement District in 1961) and primarily focused on mosquito control in wetlands and flood-prone areas including the Goleta Slough. An editorial in the Lompoc Record in 1967 describes the Goleta Slough as "marshy and mosquito ridden" (Modungo 2021). Construction of SR 217 resulted in filling of wetlands, fragmentation of habitat, and temporary closure of the estuary.

Per the California Department of Fish and Game in 1970 abatement control measures included:

> (1) weekly patrols and source reduction as needed; (2) water control work including maintenance of channels and levees, deepening of existing channels, and installation and maintenance of tidegates; and (3) introduction of small fish, particularly sticklebacks, to feed on mosquito larvae.

Historically the District operated two tide gates, one of which was not functional by 1970 (CDFG 1970). As discussed in the 1975 Goleta Slough Management Plan (Hannan 1975) (referred to as the "1975 Plan"), the District approached mosquito control as both a public health necessity and an activity that needed to be compatible with the ecological sensitivity of the Goleta Slough. In 1975, mosquito species and habitat conditions were similar to today.

Unlike earlier historical approaches that relied on marsh filling, draining, or ditching, the District avoided practices that would permanently alter wetland habitat. Page 34 of the 1975 Plan states the following:

> The Goleta salt marsh serves as an example of modern, professional mosquito control that is efficient and still compatible with the preservation of the Goleta Slough's natural state.

Consistent with current practices, under the 1975 Plan the District's operations relied heavily on continuous field surveillance:

> Qualified mosquito abatement entomologists conduct continuous appraisals of potential mosquito breeding areas. Information from bi-weekly inspections and spraying operations is systematically recorded and integrated into an abatement program

To reduce mosquito populations while preserving the ecological character of the Goleta Slough, the District implemented a combination of biological and targeted chemical controls, both considered advanced for the time. In isolated and limited freshwater pockets, staff released mosquito fish (*Gambusia affinis*), which preyed naturally on mosquito larvae and did not require supplemental feeding once established.

Chronic breeding areas that could not be controlled biologically were treated through periodic larvicide in highly targeted and restricted to areas where larvae were confirmed through field inspection.

> *Chronic breeding areas are controlled through periodic larvicide operations. Fortunately, from an environmental viewpoint, the mosquito is one of the easiest insects to exterminate, which allows abatement programs to use a minimum of chemical agents. Goleta Valley larvicide operations are*

> *accomplished through the use of a quick evaporating, low-toxic diesel/organic phosphate compound that is approved by the State Department of Health and the State Department of Agriculture and which has no injurious effect on Slough bird or fish life* (1975 Plan, Page 34)

As stated in the 1975 Plan, and as currently required, access was limited for airport safety and ecological preservation, in that vehicle traffic was confined to established berms and maintenance roads and personnel received authorized access explicitly for necessary monitoring and treatment activities.

Similar to current practices, Goleta Slough mosquito management as dictated by the Plan reflected a measured, ecologically aware program that combined biological control, limited chemical larvicide, and frequent field surveillance within the context of evolving hydrologic conditions.

After regular Goleta Slough mouth management ceased in 2012, the closure of the mouth dramatically increased mosquito populations and shifted the species composition from low-risk salt-marsh mosquitoes to high-risk freshwater disease vectors (especially western encephalitis mosquito), and substantially elevated the risk of a West Nile virus (WNV) outbreak, particularly near densely populated areas like UCSB (Rincon et al. 2016).

Goleta Slough Mouth Management History

The mouth of Goleta Slough naturally closes with beach sand periodically, increasing water levels in the Goleta Slough, which in turn increases flood risks, attracts a larger population of waterfowl, and harms fish due to due to low oxygen levels. One major consequence of a closed Goleta Slough mouth is the accumulation of standing, fresh water that creates prime mosquito breeding habitat. Without tidal flushing, mosquito populations can increase, intensifying the risk of mosquito-borne diseases and biting nuisances for nearby communities.

Under the CDPH's *Best Management Practices For Mosquito Control in California* (2023, BMPs for tidal marshes include physical and hydrological alteration:

> *Improve water flow through the wetland system to minimize stagnant water and facilitate movement of fish and other natural predators. For example, mosquitoes in coastal tidal wetlands can be managed by constructing and maintaining ditches that drain off the water when the tide falls*. (Page 19)

The District does not alter hydrology or maintain ditches as part of their duties. Managing the Goleta Slough mouth likely falls under the jurisdiction of another agency such as SBCFCD or SBA as the landowner and not the District. Historically SBCFCD has opened the mouth of the Goleta Slough to increase tidal flow as part of its routine maintenance operations since at least 1994 until permits expired in 2012. No active routine management of the Goleta Slough mouth has since occurred, other than emergency breaches of the sand bar as authorized by the USACE due to imminent risk of flooding. The Goleta Slough is dredged annually by the SBCFCD to maintain its flow capacity with the dredge spoils discharged onto the beach.

Breaching the Goleta Slough mouth or priming the crest of the berm is a flood-control measure aimed at preventing flooding and improving tidal flushing; it falls under SBCFCD's charter and permits, whereas the District's mandate is public health pest control (e.g., mosquito abatement) rather than major hydrological interventions. In addition, any artificial opening of the Goleta Slough's mouth must comply with strict environmental regulations including protection of sensitive species and water quality and requires multi-agency approvals that only the SBCFCD is authorized and equipped to obtain and implement.

SBA and SBCFCD explored options to implement management actions at the mouth of the Goleta Slough to alleviate hazards created by cessation of SBCFCD's maintenance program at the Goleta Slough mouth. The Goleta Slough mouth is on County Parks property where SBCFCD has existing right-of-entry.

Possible management options have been identified by SBCFCD and SBA based on past management of the Goleta Slough mouth, as well as a review of actions taken in similar coastal California sloughs and estuaries which include mechanical breach of the sand bar blocking the Goleta Slough mouth;

grooming/reshaping the beach and dunes to encourage breach without actually disrupting the bar itself; siphoning or pumping water out of the Goleta Slough to reduce water height, and expansion of temporary flood overflow areas. A Management Plan from SBCFCD and/or SBA and associated permits are pending.

1.4.2 Physical Characteristics

Topography and Geography

The Goleta Valley lies within a coastal valley created by vertical displacement along a syncline to the north along the Santa Ynez Fault and to the south along the east–west trending More Ranch Fault. The mesas of Isla Vista, UCSB, More Mesa and what remains of Mescalitan Island are related anticlines uplifted along the More Ranch Fault. Structurally, the Goleta Slough is a large, shallow basin flooded by tides and fed by several creeks.

The GSEMP was flooded by high sea levels in the early to mid-Pleistocene but later drained during low sea levels associated with the glaciation of the middle Pleistocene. During the latter period, drainages were excavated as much as 230 feet below current levels and the mouth of the Goleta Slough extended southward beyond its current location at Goleta Beach. During the late Pleistocene and continuing into relatively recent times, gradually rising sea levels drowned the valley, producing a navigable coastal embayment of approximately 18 square miles.

In late 1861, heavy rain continued for months in what would be known as the Great Flood of 1862, wreaking havoc throughout California. The over abundant rain caused rapid erosion and muddy water poured down through the creeks, dumping 14 feet of silt into the Goleta Slough. From the 1940s to the 1960s Mescalitan Island was used as fill material for Santa Barbara Municipal Airport, the GSD treatment plant, and SR 217 (Modugno 2021).

Current elevations within the GSEMP vary from mean sea level (2.66 feet North American Vertical Datum [NAVD]) to 140 feet above mean sea level (143-foot NAVD), with the highest points being near the northeastern boundary of the planning area along the eastern edge of More Mesa. Within the Goleta Slough basin itself, elevation gradients are much more gradual. Elevations here range from sea level to 17 feet NAVD, with the highest point immediately east of Los Carneros Road and north of the eastern CDFW Parcel on SBA property. Not coincidentally, this area includes a Native American archaeological site, as it is known to have been a historical high point within the marsh. Other points within the Goleta Slough that are higher than 17 feet NAVD are anthropogenic in nature (e.g., abandoned military bunkers, levees alongside drainages and creeks, and roads).

Watershed and Hydrology

The watershed of the Goleta Slough is approximately 48 square miles. Six creeks: Tecolotito (Glen Annie), Los Carneros, San Pedro, San Jose, Atascadero and Maria Ygnacio, drain southward off the Santa Ynez Mountains, discharging into the Goleta Slough. The San Pedro Creek watershed (Hydrologic Unit Code 180600130202) includes San Pedro, San Jose, Los Carneros, and Tecolotito creeks and their tributaries, and drains approximately 27.6 square miles, while the Atascadero Creek watershed (Hydrologic Unit Code 180600130201) includes Atascadero Creek and its tributaries, and drains approximately 19.8 square miles. Combined watersheds of these creeks drain over 48 square miles according to the National Hydrography Dataset (USGS 2025b). The Devereux Slough, UCSB Lagoon, and Laguna Blanca watersheds are also important adjacent watersheds although they do not drain into the Goleta Slough. Additionally, the Goleta Slough also receives runoff from most of More Mesa and the north-facing bluffs of UCSB.

The natural pattern for many seasonal sloughs/estuaries in Southern California, including the Goleta Slough, is to remain closed during the summer and open during the winter. Summers are characterized by small, low energy waves that deliver sand onshore so that beaches become wider and slough/estuary mouths close. Winters are characterized by large, high-energy waves that erode beach sand, shifting it offshore. Freshwater flows and less sand on the beaches prevent the Goleta Slough mouth from closing

in the winter. Tidal circulation has also been impaired by levee construction, tide gates, and other factors which have increased sedimentation.

In years of heavy precipitation, winter runoff breaches the bar (usually in December or January). The mouth remains open for varied periods (one to seven months) but seldom later than June. No active routine management of the Goleta Slough mouth has occurred since 2012, when previous permits expired, other than emergency breaches of the sand bar. Wildlife hazards, flood risks, increased mosquito breeding habitat, shifts in habitat from marsh to open water, stagnation and water quality problems have been associated with prolonged closure of the Goleta Slough mouth.

The lower reaches of all these creeks have had regular previous management actions, including silt removal projects, and structures such as check dams, concrete lining, and sediment basins are present. Tecolotito and Carneros creeks had channel realignment projects implemented in 2006 (URS Corporation 2008, Padre 2010). Flood control realignment, maintenance of the Goleta Slough creek channels, and airport construction, have also resulted in modifications to original bank configurations, Atascadero Creek was originally located adjacent to and at the base of More Mesa, approximately 100 meters south. Airport construction resulted in the relocation of Los Carneros and Tecolotito creeks (Padre 2010).

The Goleta Slough is described by the CCC as a California Critical Coastal Areas #53 (CCC 2019). Waterbodies in this Critical Coastal Area that are listed as impaired on the current (2026) Clean Water Act 303(d) list are Tecolotito Creek (impaired by sodium, chloride, nitrate, fecal coliform bacteria, E. coli bacteria, and enterococcus bacteria); Carneros Creek (impaired by fecal coliform bacteria, E. coli bacteria, enterococcus bacteria, nitrate, specific conductivity, and pH); San Pedro Creek (impaired by fecal coliform bacteria, E. coli bacteria, enterococcus bacteria, sodium, pH, and water temperature); San Jose Creek (impaired by fecal coliform bacteria, E. coli bacteria, enterococcus bacteria, chloride, sodium, specific conductivity, pH, and water temperature); Atascadero Creek (impaired by fecal coliform bacteria, E. coli bacteria, enterococcus bacteria, chloride, sodium, dissolved oxygen, nitrate, toxicity, benthic community effects, pH, and water temperature); Maria Ygnacio Creek (impaired by fecal coliform bacteria, E. coli bacteria, enterococcus bacteria, turbidity, sodium, and pH); and Pacific Ocean at Goleta Beach (impaired by total coliform bacteria). Potential sources of these pollutants are all listed as Source Unknown or No Analysis Available (CCC 2019, SWRCB 2026).

Geology and Soils

As described in the GSEMP the low-lying portions, like most of the Goleta Valley, are covered with recent, unconsolidated alluvial deposits of silt and sand. Older alluvial deposits cap More Mesa, UCSB and what remains of Mescalitan Island. Along the slopes and ravines of the mesas and Mescalitan Island, older shales, sandstones, and siltstones, primarily the Monterey formation and, more locally, the Santa Barbara formation, are exposed (GSMC 2015).

Most soils within the GSEMP are fine sandy loams, which is to be expected for an alluvial basin at the base of the Santa Ynez range and at the confluence of many creeks and watersheds. A few clay lenses are also found along the tops of the coastal mesas. Soils near the Mescalitan Island Native American archaeological sites are characterized as “Xerorthents” (cut and fill areas), perhaps because these high points around the Goleta Slough margin have been excavated for fill soil, or due to the large amount of midden material in these areas, or both. The central portion of the GSEMP at the SBA is designated as “Aquents – fill areas” or “Aquents – flooded” (GSMC 2015, USDA NRCS2025). More Mesa soils include loamy sand, fine sandy loam, clay and beaches, including Baywood loamy sands, Camarillo fine sandy loam, Concepcion fine sandy loam, and Diablo Clay (USDA NRCS 2026).

The present character of the Goleta Slough also reflects historic and anthropogenic impacts on sediment supply. Actions such as historic overgrazing, altered watershed hydrology due to urbanization and development, channelization of the creek banks, constrained mouth dynamics, and the removal of sediment from the creek channels have all contributed to the disruption of the natural sediment dynamics that shape the Goleta Slough landscape and altered patterns of erosion and deposition within the Goleta Slough’s waterways and wetlands (GSEMP 2015).

1.4.3 Biological Characteristics

Goleta Slough Ecosystem Land Cover

Terrestrial vegetation within the Goleta Slough Ecosystem is strongly influenced by elevation and man-made disturbance. Table 2 summarizes general vegetation types of the GSEMP.

Table 2 Goleta Slough Ecosystem General Vegetation Communities and Land Cover

	Approximate Acres	Potential Treatment Area,
Developed	649	No
Grasslands	449	Portions
Coastal sage scrub & mixed grassland	108	No
Coastal bluff scrub	16	No
Oak woodland	23	No
Non-native woodland	32	No
Agricultural	256	Portions
Beach	16	No
Estuarine wetlands and deepwater habitats	144	Yes, estuarine wetlands
Riverine wetlands	28	Yes
Palustrine wetlands	252	Yes
Transitional wetland habitats	291	Yes
Managed ponds	9	Yes

Source: 1997 GSEMP

Comprehensive mapping of SBA using the A *Manual of California Vegetation, 2nd edition* (Sawyer et al. 2009) was completed for the SBA in 2012 identified 40 different vegetation associations and alliances (Dudek 2012), incorporated herein by reference. Other areas in the GSEMP have been mapped to the alliance level as part of development proposals or planning efforts (Rincon 2010, 2022).

Several parts of the Goleta Slough have been subject to, and are currently undergoing, restoration activities meant to improve the range of environmental characteristics it provides (GSMC 2015).

1.4.4 Treatment Area Habitats and Wildlife

The discussion below focuses on the National Wetland Inventory (NWI) and treatment areas under each classification included under Figure 1 and Table 1.

Estuarine and Marine

Past studies of the Goleta Slough indicate that the invertebrate fauna is not very rich in number of species or in density of organisms present (Fong et al. 1988). The California jackknife clam (*Tagelus californianus*) is the dominant infaunal (living in bottom sediments) species. Other infaunal species present include the common littleneck clam (*Protothaca staminea*), bent-nose clam (*Macoma nasuta*) and three species of polychaete worm. The epifauna (living on top of the sediments) is characterized by the California horn snail (*Cerithidea californica*), lined shore crab (*Pachygrapsus crassipes*), and mud crab (*Hemigrapsus oregonensis*). Amphipods, such as *Traskorchestia traskiana* and *Megalorchestia californiana*, reside on the banks (Padre 2010). The salt marsh snail (*Melampus olivaceus*) reaches its northern limit at the Goleta Slough. Senile tiger beetle (*Cicindela senilis frosti*) also reaches its northern distributional limit at the Goleta Slough (Padre 2010).

A variety of fish use the Goleta Slough, at least seasonally, and at least 23 species have been reported (Padre 2010; Rincon 2023, 2024, 2025). Numerous fish surveys have been conducted in the Goleta Slough, primarily focusing on determining the distribution of Federal Endangered tidewater goby (TWG; *Eucyclogobius newberryi*). These surveys have been conducted as part of projects by the SBA and Caltrans. Fishes identified during these surveys include topsmelt (*Atherinops affinis*), arrow goby (*Clevelandia ios*), California halibut (*Paralichthys californicus*), California killifish (*Fundulus parvipinnis*), cheekspot goby (*Ilypnus gilberti*), longjaw mudsucker (*Gillichthys mirabilis*), mosquito fish, Pacific herring (*Clupea pallasii*), Pacific staghorn sculpin (*Leptocottus armatus*), prickly sculpin (*Cottus asper*), shadow goby (*Quietula y-cauda*), and partially armored threespine stickleback (*Gasterosteus aculeatus*). In brackish portions of the Study Area, dense marsh vegetation may also provide shelter for special-status species such as the TWG.

Coastal Salt Marsh/Estuarine and Marine Wetland

Coastal salt marshes are found in the basins south of airport runways and tidal portions of Atascadero Creek where freshwater drainages meet the sea, forming estuaries, and in non-tidal wetlands where high salinities persist due to historic tidal influence. Plants are adapted to soils with high salt concentrations and low oxygen levels, and to periodic flooding and drying from fluctuating tides. Many have succulent leaves and mechanisms for expelling excess salts, as well as the ability to move oxygen to the roots in heavy, anoxic soils. Salt marshes are unique habitats that provide valuable nurseries for many marine fishes, and are vital for both migratory and resident birds, such as the endangered BSS. Special-status fish species including southern California steelhead (*Oncorhynchus mykiss irideus* pop. 10; federally endangered [FE] and state endangered [SE]) and TWG could use these marshes. Channels that have substantial tidal flow and inundation would not support mosquitoes and thus would not need to be treated.

This sensitive natural community occurs in the Goleta Slough in the form of four vegetation alliances: pickleweed mats, alkali heath marsh, salt grass flats, and salt marsh bulrush depicted under Estuarine and Marine Wetland in Figure 2 (Dudek 2012). Special-status plants include Coulter's goldfields (*Lasthenia glabrata* ssp. *coulteri*; California Rare Plant Ranks [CRPR] 1B.1, Locally Rare [LR]), woolly seablite (*Suaeda taxifolia*; CRPR 4.2, LR), and estuary seablite (*Suaeda esteroa*; CRPR 1B.2, LR). No special-status amphibians or aquatic reptiles occupy these habitats.

Tidal areas and pickleweed habitats support a robust suite of passerine species in the Study Area. Species occurring here year-round include killdeer (*Charadrius vociferus*), Belding's savannah sparrow (BSS; *Passerculus sandwichensis beldingi*, FE), greater yellowlegs (*Tringa melanoleuca*), long-billed curlew (*Numenius americanus*), least sandpiper (*Calidris minutilla*), and long-billed dowitcher (*Limnodromus scolopaceus*). Species occurring here seasonally include migrants such as the western sandpiper (*Calidris mauri*), Baird's sandpiper (*Calidris bairdii*), pectoral sandpiper (*Calidris malanotos*), dunlin (*Calidris alpina*), and short-billed dowitcher (*Limnodromus griseus*) and duck species, particularly green-winged teal (*Anas crecca*).

Large eucalyptus trees northwest of The Ellwood at Goleta Beach and on the Southern California Gas Company (SoCalGas) facility and myoporum along Tecolotito Creek, are historically and currently consistently used for roosting by great blue herons, black-crowned night herons (*Nycticorax nycticorax*), snowy egrets (*Egretta thula*), and double-crested cormorants (*Nannopterum auritum*) (GSMC 2015).

Key mosquito species in coastal salt marshes include:

- Black salt marsh mosquito (*Aedes taeniorhynchus*): The dominant salt marsh species. Eggs are laid on moist soil at marsh edges; when spring tides or winter/spring rains flood these areas, eggs hatch synchronously, producing massive larval cohorts. In the Goleta Slough, black salt marsh mosquito populations can increase 100-fold when the lagoon mouth closes and impounds water. This typically occurs in late winter through spring. Black salt marsh mosquito is an aggressive daytime biter that disperses widely (up to 5 to 10 miles), It can also vector diseases such as Eastern Equine Encephalitis (though rare in California, the species is a competent vector).

- Western encephalitis mosquito (*Culex tarsalis*): A primary WNV vector in California and the dominant nuisance species in coastal marshes and is common at the Andree Clark Bird Refuge, the Goleta Slough, and in many of the creeks (District 2026). This species breeds in a variety of freshwater and brackish habitats, including the edges of coastal marshes, irrigation ditches, and flooded pastures. Spring and early summer are critical for population buildup. WNV amplification in bird reservoirs peaks in late spring/early summer, with virus prevalence rising in mosquitoes by June through July.
- Southern house mosquito (*Culex quinquefasciatus*): Another competent WNV vector, abundant in urban and wetland habitats. Breeds prolifically in stagnant water (storm drains, bird baths, and marsh edges). Peak breeding occurs April through September.
- Tule mosquito (*Culex erythrothorax)*: Common in freshwater marsh vegetation. While less implicated in disease transmission, it contributes to severe nuisance biting near wetlands. Larvae develop in standing water in spring.

Lagoon/Estuarine and Marine Deepwater

Lagoons (such as the Goleta Slough mouth when closed), are located at the mouths of creeks or rivers where they enter the ocean or bay, but isolated from the receiving waterbody by a berm, are indirectly influenced by the tide., This may cause freshwater to back up within the lagoon, and may also allow water to percolate through the berm, with the direction of such movement depending on water levels on either side of the berm. As a result, lagoons often contain a lens of freshwater at the surface and brackish water at the bottom. Lagoons may therefore contain species from both creeks and rivers, and from the receiving waterbodies. Amphibians are not likely to occur in lagoons due to elevated salt content but could occur at the upstream end of the lagoon, within the backwater, but above the reach of the saline influence. Lagoons would support mosquitoes in areas of reduced circulation, often associated with emergent vegetation. While not undertaken by the District, physical control in lagoons would include reconnecting isolated areas to the main lagoon in consultation with USFWS, National Marine Fisheries Service (NMFS), and CDFW.

Freshwater Emergent Wetland

Freshwater Marsh/Seeps

Freshwater marshes and seeps may provide ideal habitat for mosquito breeding due to their substantial areas of shallow water, limited circulation, and emergent vegetation. Freshwater marshes and seeps may provide ideal habitat for mosquito breeding due to their substantial areas of shallow water, limited circulation, and emergent vegetation.

Freshwater marshes are found on SBA including the Duck Pond (Area K) and Tule Pond (Area J), the SoCalGas facility, typically occurring in soils that hold rainwater or are fed by springs or seeps. They are characterized by emergent hydrophytes (perennial wetland plants that emerge from rhizomes after dormancy), including cattails, rushes, sedges, and grasses. Also found in these habitats are annuals such as forbs and grasses, and woody perennials like willows. Some freshwater marshes are vernal, filling with available rainwater before drying seasonally, and some are perennially wet.

Sensitive, naturally- occurring freshwater marshes include a California bulrush marsh and cattail marshes. Western rush marshes alliances (Dudek 2012) occur in disturbed wetland and marsh areas.

Songbirds such as song sparrows and common yellowthroats commonly nest in these marshes, while red-winged blackbirds (*Agelaius phoeniceus***)** also breed in bulrush and cattail marshes. When inundated in spring, freshwater marshes may support nesting by American coots (*Fulica americana*) and pied-billed grebes (*Podilymbus podiceps*), and they provide suitable habitat for secretive marsh birds such as Virginia rails and soras, with least bitterns occurring infrequently. The edges of these marshes are regularly used by wading birds such as snowy and great egrets for foraging.

Shorebirds known from the Goleta Slough include great egret (*Ardea alba*), great blue heron (*Ardea herodias*; nesting), double-crested cormorant (*Nannopterum auritum*), Caspian tern (*Hydroprogne caspia*), brown pelican (*Pelecanus occidentalis*), snowy egret (*Egretta thula*), mallard (*Anas platyrhynchos*), and violet green swallow (*Tachycineta thalassina*) (Padre 2010). Common medium or large sized mammal species include coyote (*Canis latrans*), Virgina opossum (*Didelphis virginiana*), and common raccoon (*Procyon lotor*).

Seasonal Wetlands/Marsh

For this Plan and for the purposes of determining mosquito breeding habitat, seasonal wetlands are defined as areas that are flooded for one week or more during the year, generally during the rainy season; this differs from the USACE hydrological definition. Examples of forb dominated wetland alliances include non-native Harding Grass Swards, Curly Dock Patches, Giant Reed Breaks, Poison Hemlock Patches, Smartweed-Cocklebur Patches, and Bristly Ox-Tongue Patches (Dudek 2012). These areas are not CDFW sensitive communities but are considered ESHA if sensitive species are present.

Vernal Pool

Vernal pools are seasonal wetlands that occur in shallow depressions where there is an underlying impermeable layer that holds water after saturation. They typically fill with winter rains and dry up by early to late spring. Distinct rings of vernal pool vegetation may become apparent as the water dries. Pools remain dry through the summer months and are generally no more than 18 inches deep at maximum inundation, developing the flora of vernal marshes when deeper. Unique plant and animal species are adapted to this cyclical process of wetting and drying, including coyote thistles, clam shrimp, and many species of birds. Many of these species of plants begin their lives underwater and finish their life cycles in dry, exposed soil. Vernal pools are considered CDFW sensitive and ESHA and example alliances include meadow barley (*Hordeum brachyantherum)* and needle spikerush (*Eleocharis macrostachya*).

Riparian Corridor / Freshwater Forested/Shrub Wetland

Riparian corridors are present along the natural freshwater portion of the Atascadero, Tecolotito, Los Carneros, and Old San Jose creeks; and in the SoCalGas facility. Because their rapid currents do not provide suitable habitat for mosquitoes, creeks generally do not support substantial numbers of mosquitoes; although some mosquitoes can be found in slow eddies, back channels, or in isolated pools on the banks as flows recede. While isolated pools and back channels may provide habitat for mosquito larvae, they may also provide excellent rearing habitat for young fish and amphibians, as they provide warmer water temperatures, higher primary productivity, and protection from predaceous fish. Where native or special-status species are present, these areas could be important nursery areas, depending on location, season, species present, and amount of other habitat available to the species. Treatments in creeks are restricted to sections that run through or directly next to homes or businesses in urban or suburban areas.

Vegetation alliances include Arroyo Willow Thickets (CDFW Sensitive), Mulefat Thickets, and Eucalyptus Grove. Riparian corridors provide nesting, foraging, and wintering habitat for a variety of birds, including the Anna's hummingbird (*Calypte anna*), Nuttall's woodpecker (*Picoides nuttallii*), bushtit (*Psaltriparus minimus*), wrentit (*Chamaea fasciata*), ruby-crowned kinglet (*Regulus calendula*) yellow-rumped warbler (*Setophaga coronata*), common yellowthroat (*Geothlypis trichas*), spotted towhee (*Pipilo maculatus),* song sparrow (*Melospiza melodia*), house finch (*Carpodacus mexicanus*), and lesser goldfinch (*Spinus psaltria*). Wilson's warblers (*Cardellina pusilla*) and warbling vireos (*Vireo gilvus*) are among species that use this habitat during migration. Some special-status bird species have been observed foraging include yellow warbler (*Setophaga petechia*; SSC) and yellow-breasted chat (*Icteria virens*; SSC) (Dudek 2012). Raptors include red-tailed hawks (*Bueto jamaicensis*), Cooper's hawks (*Astur cooperii*; CDFW Watch List [WL]), and great horned owls (*Bubo virginianus*). Medium-sized mammals, such as the common raccoon, striped skunk (*Mephitis mephitis*), and coyote, may follow the riparian edges along creek beds. Baja California treefrogs (*Pseudacris hypochondriaca*) inhabit this community, and reptiles such as the coast range garter

snake (*Thamnophis elegans terrestris*), California alligator lizard (*Elgaria multicarinata multicarinata*), and San Diego gopher snake (*Pituophis catenifer annectens*) may occur here.

Freshwater Pond

Water and Wastewater Management Facilities

These include the two treatment areas on the GSD Treatment Plant and flood control channels and ditches. Wastewater treatment facilities do not provide habitat for native or special-status fish species, although such facilities may be located adjacent to suitable stream habitats, and hydrologic connectivity may exist between the facility and the natural environment that could allow aquatic resources to enter the facility. The extent to which these species may enter these facilities is unknown, but they may support special-status species where they have standing water for sufficient periods of time and have suitable physical and vegetative structure. Generally, sewage treatment ponds do not provide habitat for native fish or special-status fish, amphibian, or reptile species.

Ponds and Lakes

The freshwater habitats that could be treated include the margin of reservoirs and ponds (including artificial ponds such as golf course ponds) and include Rancho Goleta Lake in the Study Area. These areas are generally man-made habitats, and if they support fish, these fish will largely consist of introduced species.

Agricultural areas, Urban Interface and infrastructure

The term “temporary standing waters” refers waters refers to water ponding on an upland habitat because of rainfall or irrigation. These areas are generally not considered ESHA or sensitive habitat.

1.5 Regulated Biological Resources

1.5.1 Methodology

The Goleta Slough has been extensively studied through numerous biological, ecological, and environmental investigations conducted over multiple decades, resulting in a robust body of published and unpublished survey data and resources applicable to the Study Area.[1] The following sections describe the methodology for the literature review.

Protected Resources

For the purposes of this report, Regulated or sensitive resources studied herein include protected and special-status species, nesting birds and raptors, ESHA, and coastal wetlands and include the following:

- Species listed as candidate, threatened, endangered, or proposed under the federal Endangered Species Act (ESA)
- Species listed as candidate, threatened, endangered, or rare by the CDFW under the California Endangered Species Act or Native Plant Protection Act

[1] Note that this study did not include field surveys, and the findings in this report are based on literature review as defined in the Methodology section. Standard data sources relied upon during the completion of this report, such as the California Natural Diversity Database (CNDDB), may vary regarding accuracy and completeness. In particular, the CNDDB is compiled from research and observations reported to CDFW that may or may not have been the result of comprehensive or site-specific field surveys. Although Rincon believes the data sources are reasonably reliable, Rincon cannot and does not guarantee the authenticity or reliability of the data sources it has used. Additionally, pursuant to our contract, the data sources reviewed included only those that are practically reviewable without the need for extraordinary research and analysis.

- Species designated as Fully Protected by the California Fish and Game Code (CFGC), and SSC by the CDFW
- Species listed as State Rare under the Native Plant Protection Act
- Species on the CDFW Special Animals List with a State Rank imperilment status of S1-S3
- Species with California Native Plant Society (CNPS) CRPR 1A, 1B, 2A 2B, and 4
- Sensitive Natural Communities listed as Sensitive on CDFW's California Natural Community List (CDFW 2025)
- Waters of the United States that are subject to the jurisdiction of the USACE and Regional Water Quality Control Board (RWQCB) under Sections 404 and 401 of the federal Clean Water Act
- Waters of the State that are subject to the jurisdiction of the RWQCB under the Porter-Cologne Water Quality Control Act, Lakes and streambeds under CDFW jurisdiction pursuant to CFGC Sections 1600 et seq., and CCA Section 30231
- Coastal resources protected under the CCA and certified Local Coastal Programs: City of Santa Barbara Land Use Plan, County of Santa Barbara Eastern Goleta Valley Community Plan, UCSB Long Range Development Plan

Literature Review

This analysis is a literature review for baseline information on biological resources potentially occurring in the GSEMP Study Area, and surrounding area. Rincon conducted a literature review to characterize the nature and extent of biological resources on and adjacent to the Study Area largely based on the GSEMP and updated where applicable. The literature review included an evaluation of current and historical aerial photographs of the site regional and site-specific current and historical topographic maps, and climatic data (UCSB 2026, SBCFCD 2026, Google Earth 2026).

Queries of the USFWS Information for Planning and Consultation system (USFWS 2025a) and USFWS Critical Habitat Portal (USFWS 2025b), CDFW California Natural Diversity Database (CNDDB; CDFW 2025a), The CNPS online Inventory of Rare and Endangered Plants of California (CNPS 2026) were conducted to obtain comprehensive information regarding special-status plant species, considered to have potential to occur within the *Goleta, California* USGS 7.5-minute topographic quadrangle and the surrounding five quadrangles (*Dos Pueblos Canyon, Lake Cachuma, San Marcos Pass, Little Pine Mountain,* and *Santa Barbara*).

The results of database-queries and lists of special-status species were reviewed by Rincon's regional biological experts for accuracy and completeness. The final list of biological resources (special-status species and sensitive natural communities) was evaluated based on documented occurrences within the nine-quadrangle search area and biologists' expert opinions on species known to occur in the region.

To aid in characterizing the nature and extent of coastal wetlands occurring within the Study Area, resources including the most recent *Goleta, California* USGS 7.5-minute topographic quadrangle map, and the United States Department of Agriculture, Natural Resources Conservation Service (USDA, NRCS) Web Soil Survey (USDA, NRCS 2026) were reviewed. Additionally, the National Hydrography Dataset (USGS 2026) and National Wetlands Inventory (USFWS 2025c) were reviewed to determine whether any potential wetlands and/or other waters have been previously mapped within the Study Area.

The literature review included site-specific and surrounding reports, information in peer-reviewed journals, and standard and location-specific reference materials (Lehman 2025, Xerces 2025, Smith 1997, Meade 2017). Other sources of information about the Study Area included aerial photographs, topographic maps, geologic maps, climatic data, past management plans, and activity descriptions. The Rare Plants of Santa Barbara County list was also reviewed (Santa Barbara Botanical Gardens [SBBG] 2018). Previous biological studies for projects overlapping the Study Area and in the immediate watershed were reviewed (URS 2008; Dudek 2012; Rincon 2016, 2021, 2022, 2025; City of Goleta 2008, 2022, 2024; Caltrans 2020; Coffman and Associates, Inc. 2017; Padre 2010). Where applicable citizen science databases were also

reviewed (Santa Barbara Audubon Society [SBAS] 2026, Cornell Lab of Ornithology 2026, iNaturalist 2026).

1.5.2 Special-Status Species

The analysis below focuses on the GSEMP area; however, each treatment area in the coastal zone is anticipated to have similar wildlife and plant species.

This section discusses special-status species and regulated biological resources observed on the Study Area and evaluates the potential for the Study Area to support additional regulated biological resources. Assessments for the potential occurrence of special-status species are based upon known ranges, habitat preferences for the species, species occurrence records from the CNDDB and other sources, and previous reports. The potential for each special-status species to occur in the Study Area was evaluated according to the following criteria:

- **Not Expected.** Habitat on and adjacent to the site is clearly unsuitable for the species requirements (foraging, breeding, cover, substrate, elevation, hydrology, plant community, site history, disturbance regime), and species would have been identifiable on the site if present (e.g., oak trees). Protocol surveys (if conducted) did not detect species. The species is not expected to be found on the site.
- **Low Potential.** Few of the habitat components (foraging, breeding, cover, substrate, elevation, hydrology, plant community, site history, disturbance regime) meeting the species requirements are present, and/or the majority of habitat on and adjacent to the site is unsuitable or of very poor quality. Protocol surveys (if conducted) did not detect species. The species has a low probability of being found on the site.
- **Moderate Potential**. Some of the habitat components (foraging, breeding, cover, substrate, elevation, hydrology, plant community, site history, disturbance regime) meeting the species requirements are present, and/or only some of the habitat on or adjacent to the site is unsuitable. The species has a moderate probability of being found on the site.
- **High Potential.** All the habitat components (foraging, breeding, cover, substrate, elevation, hydrology, plant community, site history, disturbance regime) meeting the species requirements are present and/or most of the habitat on or adjacent to the site is highly suitable. The species has been reported on or adjacent to the Study Area in the last two to five years and suitable habitat is still present on-site. The species has a high probability of being found on the site.
- **Present.** The species was observed on the site or has been recorded (e.g., CNDDB, other reports) on the site recently (within the last two years).

Special-Status Plant Species

Special-status plant species typically have specialized habitat requirements, including plant community types, soils, and elevational ranges. The literature review identified 30 special-status plant species that have been previously recorded within the nine-quadrangle vicinity of the Study Area. Of the 30 special-status plant species identified in the CNDDB review (excludes Locally Rare), 14 are not expected to occur because habitat on and adjacent to the Study Area is clearly unsuitable for the species' based on a variety of factors, including the disturbance history of the site, lack of suitable soils or habitat, elevation of the site, or inappropriate hydrologic conditions. Two of these species have a low potential to occur based on site conditions in the Study Area. Of these 30 special-status plant species, six are assumed present (Table 3). The species with low potential to occur are not expected to occur based on a variety of factors, including the lack of suitable habitat, soils, and/or other required microhabitat conditions, and/or the Study Area location in relation to the species known geographic and/or elevational range and are therefore omitted from further discussion.

As discussed below under Table 3 Coulter's goldfields and southern tarplant (*Centromadia parryi* ssp. *australis*; CRPR 1B.1) preferred habitat is margins of coastal salt marsh and mudflats, which occur in the Study Area. Other upland species are known from upland (Santa Barbara honeysuckle [*Lonicera*

subspicata var. *subspicata*; CRPR 1B.2]) or beach habitats (red sand verbena [*Abronia maritima*; CRPR 4.2]) as summarized under Table 3 and discussed below.

Table 3 Special-Status Plant Species Present in the GSEMP

Species	Status (Federal/State)	Reasoning
red sand verbena *Abronia maritima*	None/None CRPR 4.2	Red sand verbena is a trailing succulent sand-dune plant found mostly on coastal strand. The species was observed at Goleta Beach and west of the Goleta Beach Park (County of Santa Barbara 1998). Recently observed at the Goleta Slough mouth north of the tidal connection at the base of the bluffs near the SoCalGas property. Outside any treatment areas and is not discussed further.
southern tarplant *Centromadia parryi* ssp. *australis*	None/None CRPR 1B.1	The species has been recently documented within the Study Area, specifically along the edges of the wetlands and access roads at the western portion of the Goleta Slough. Planted in 2010 at the Basins E and F restoration, considered to be present in the SBA salt marsh vegetation.
Coulter's goldfields *Lasthenia glabrata* ssp. *coulteri*	None/None CRPR 1B.1	Observed in Basins. Planted in 2010 at the Basins E and F restoration, considered to be present in the salt marsh vegetation (Rincon 2025).
Santa Barbara honeysuckle *Lonicera subspicata* var. *subspicata*	None/None CRPR 1B.2	Multiple CNDDB occurrence within five miles of the Study Area, and the species has been recently documented within the Study Area, specifically in woodland habitat at the southern portion of the Goleta Slough. Often used in Study Area upland restoration projects
woolly seablite *Suaeda taxifolia*	None/None CRPR 4.2 SBBG Rare	Planted in 2010 at the Basins E and F restoration, considered to be present in the salt marsh vegetation (Rincon 2025).
estuary seablite *Suaeda esteroa*	None/None CRPR 1B.2	One historical CNDDB occurrence from 1979 at the southern portion of the Goleta Slough. Planted in 2010 at the Basins E and F restoration, considered to be present in the salt marsh vegetation (Rincon 2025).

CDFW 2026a

CRPR = California Department of Fish and Wildlife (CDFW) California Rare Plant Rank

CRPR 1B.1 = Rare, Threatened, or Endangered in California and elsewhere; seriously threatened in California

CRPR 1B.2 = Rare, threatened, or endangered in California and elsewhere; moderately threatened in California

CRPR 1B.3 = Rare, threatened, or endangered in California and elsewhere; not very threatened in California

CRPR 4.2 = Limited distribution, moderately threatened in California

SBBG = Santa Barbara Botanical Garden

Locally rare species designated by SBBG or the GSEMP in potential treatment areas at SBA include Leopold's rush (*Juncus acutus* ssp. *leopoldii*; CRPR 4.2), Parish's glasswort (*Arthrocnemum subterminale*), shore grass (*Distichlis littoralis*), and short-seeded waterwort (*Elatine brachysperma*), and on More Mesa include Lemmon's phalaris (*Phalaris lemmonii*), water pygmy weed (*Crassula aquatica*), bur-reed (*Sparganium eurycarpum*), southern water saltmarsh (*Symphyotrichum subulatum* var. *ligulatum*), and horned pondweed (*Zannichellia palustris*) (SBBG 2018; GSMC 2015; Rincon 2010, 2025).

Southern Tarplant

Southern tarplant is a CRPR 1B.1 species known from margins of marshes and swamps, vernally mesic valleys and grasslands, and vernal pools at elevations ranging from sea level to 425 meters elevation. Southern tarplant is an annual herb that typically blooms between May and November and is locally common on sandy mesas in the Goleta area (Rincon et al. 2016). Fourteen CNDDB occurrences are documented within five miles of the Study Area, including four occurrences that overlap with the Study

Area, primarily on the western portion of the Study Area and one along SR 217 at the southern portion of the Study Area (Occurrence 32, 33, 99, and 100). Southern tarplant has been documented in the Study Area in restoration areas, dredge spoil areas, edges of wetlands, and other open sites (Rincon 2025). Recent observations are documented along the paved access roads within the SBA, along the edges of the Goleta Slough wetlands included where planted for restoration at Basins E and F. The species is present within the Study Area and was observed where populations are known during 2026 SBA treatment monitoring.

Coulter's Goldfields

Coulter's goldfields is a CRPR 1B.1 species known from saltwater marshes, swamps, playas, and vernal pools at elevations ranging from sea level to 1,220 meters. Coulter's goldfields is an annual herbaceous plant that typically blooms between February and June. It has been documented in the Study Area, and known occurrences are presumed extant (Rincon 2025); however, this plant only germinates during years of extensive and prolonged rain and can go several years without being present. It is known from the western Study Area near the Tecolotito Creek branch of the Goleta Slough and was planted as part of restoration project at Basins E and F.). It is reported growing in moist silty soil of an alkaline mudflat with pickleweed (*Salicornia pacifica*), meadow barley (*Hordeum brachyantherum*), and alkali weed (*Cressa truxillensis*). The species is present within the Study Area and was observed where populations are known during 2026 SBA treatment monitoring.

Santa Barbara Honeysuckle

Santa Barbara honeysuckle (*Lonicera subspicata* var. *subspicata*) is a perennial evergreen shrub/vine commonly found in chaparral, cismontane woodland, and coastal scrub habitats and is often a component of restoration on the Study Area. The species is ranked by the CNPS as a List 1B.2 species, meaning the species is moderately threatened in California. Suitable woodland habitat is present along portions of the Goleta Slough basin edges and maintained access roads, specifically along the southern portion of the Goleta Slough, near the GWSD, Duck Pond (Area K), Tule pond (Area J), and White Pole (Area I). Sixteen CNDDB occurrences are documented within five miles of the Study Area, including one occurrence from 2013 within the Study Area along Los Carneros Road, west of the Goleta Slough on UCSB (Occurrence 26, CDFW 2025a).

Estuary Seablite

Estuary seablite (*Suaeda esteroa*) is a CRPR 1B.2 plant species known to occur in coastal salt marshes and swamps at elevations ranging from sea level to 5 meters elevation. The Study Area is within this species' known geographic and elevational range, and this species was documented within the Goleta Slough from 1948 to 1979. One historical (1979) CNDDB occurrence at an unknown location within the Goleta Slough was mapped south of the SBA (Occurrence 21; CDFW 2025a). It was previously reported from the Study Area in 2001 in Area I near SR 217, though 2012 surveys did not find any individuals; this area was degraded with stands of black mustard in 2012 (Dudek 2012). Suitable habitat persists in the Study Area in pickleweed and alkali heath marsh, and it could occur in other areas of the site such as the mid-marsh areas that are not often accessed. The species has a high potential to occur within the Study Area coastal salt marsh treatment areas.

Woolly Seablite

Woolly seablite (*Suaeda taxifolia*), a CRPR 4.2 species that occurs in coastal bluff scrub, coastal dunes, and the margins of coastal salt marshes and swamps. This shrub is found from sea level to 50 meters (0-164 feet) elevations and is known to bloom from January to December. It was found in the Study Area in a dredge spoils area near the GWSD in 1980, and on several occasions around nearby Goleta Beach, between 1927 and 1964. Smith (1998) considers it common around salt marshes. It was not detected during 2012 surveys (Dudek 2012). Although coastal bluff scrub and coastal dunes are absent in the

Study Area, this species has the potential to occur at the margins of pickleweed mats, alkali heath marsh, salt flats, mud flats, and saltgrass flats.

1.5.3 Special-Status Wildlife Species

The literature review identified 53 special-status animal species that are known to occur within five miles of the Study Area. Of these 53 species, 18 animals were evaluated as present or with a high potential to occur with the treatment areas. A discussion of the findings is provided in each section below and summarized in Table 4.

Table 4 Special-Status Wildlife Species Present with a High Potential to Occur in the Goleta Slough Study Area

Species	Status (Federal/State)	Study Area Potential	Reasoning
Invertebrates			
Crotch's bumble bee *Bombus crotchii*	None / California Endangered Species Act Candidate	High (foraging) Low (nesting)	Female observed in 2017 foraging in the Study Area in the Cabrillo Business Park coastal sage scrub restoration site. Seven individuals were observed since 2017 within four miles of the Study Area (CDFW 2025a). Nests are often more commonly thought to be underground in abandoned rodent dens but may be above ground in tufts of grass, old bird nests, rock piles, or cavities in dead trees (Hatfield et al 2015). Nests are found in upland areas and are not anticipated to be in treatment or access areas. Not discussed further in this section.
monarch butterfly – California overwintering population *Danaus plexippus* pop. 1	FPT / None	Present	Proposed critical habitat is designated within the Study Area, extending from Goleta Beach to approximately 0.85 miles northeast along Atascadero Creek (89 FR 100662-100716; USFWS 2025a). Four known overwintering sites overlap the Study Area: Xerces Site #2765, #3174, and #3177.Monarchs have been observed overwintering in two locations on the SoCalGas Facility along Atascadero Creek at Xerces Site ID 2765 Although the population has decreased with the California-wide population trend, this site remains one of the most populated sites in the County (Xerces 2026, Griffiths 2017)
Fish			
tidewater goby *Eucyclogobius newberryi*	FE / SSC	Present	Critical habitat designated in Goleta Slough Complex and species has recently been recorded in San Jose Creek aquatic habitat (Rincon 2023, 2024, and 2025).
southern California steelhead *Oncorhynchus mykiss irideus* pop. 10	FE / SE	Moderate (transient during high flows)	Critical habitat designated in Goleta Slough Complex. No documented CNDDB records of this species within five miles of the Study Area (CDFW 2025). However, there are multiple historical sightings of the species within the Goleta Slough Complex, as documented in Stoecker et al. 2002.
Reptiles			
southwestern pond turtle *Actinemys pallida*	FPT / SSC	Present	Known only from an SBCFCD pond turtle mitigation site in Atascadero Creek at the Patterson Avenue Bridge (CCC 2025).
Birds			
Belding's Savannah sparrow (BSS) *Passerculus sandwichensis beldingi*	None / SE	Present	There are many recorded occurrences of BSS in the Study Area in suitable tidal habitat in Basins A-G, with historical sightings in H. (SBAS 2025, Dudek 2021).

Species	Status (Federal/State)	Study Area Potential	Reasoning
western snowy plover *Charadrius nivosus nivosus*	FT / SSC	Moderate (transient/foraging) Not expected (nesting)	Two known CNDDB occurrences are documented within the Study Area, including within Goleta Beach, which is a historic breeding ground for the species. Continued high disturbance levels from humans and dogs are likely to continue deterring this species from nesting here (Rincon et al. 2016). Given the lack of nesting habitat in treatment areas, this species is not discussed further.
California least tern *Sternula antillarum browni*	FE / SE, FP	Moderate (transient/foraging) Not expected (nesting)	Low potential to forage past the Goleta Slough over creek channels. No Study Area nesting habitat. Given the lack of nesting habitat in treatment areas, not discussed further.
yellow warbler *Setophaga petechia*	None / SSC	High (transient/foraging) Low (nesting)	No known CNDDB occurrences within five miles of the Study Area (CDFW 2025a). Several detections are recorded from 2023 at the GWSD and UCSB campus, within and adjacent to the Study Area (SBAS 2026). Detected in or adjacent to the Old San Jose Creek riparian corridor within the Study Area (Rincon 2021).
yellow breasted chat *Icteria virens*	None/ SSC	High (transient/foraging) Low (nesting)	No known CNDDB occurrences within five miles of the Study Area (CDFW 2025). One detection is recorded from 2023 at the Arroyo Burro Open Space, approximately 2.5 miles east of the Study Area (SBAS 2026). Detected in or adjacent to the Old San Jose Creek riparian corridor within the Study Area, nests not detected (Rincon 2021)
white-tailed kite *Elanus leucurus*	None / FP	Present	Recent occurrences within More Mesa and the Goleta Slough (CDFW 2025, SBAS 2026). The species is known to nest in trees (e.g., coast live oak) only in More Mesa in the Study Area.
Cooper's hawk *Accipiter cooperii*	None / WL	High (nestling/ transient/foraging)	Four known CNDDB occurrences within five miles of the Study Area, including one occurrence from 2009 that overlaps with the Study Area at More Mesa (Occurrence 137, CDFW 2025). The SBAS documents several recent detections within More Mesa, including nesting activity in 2022, and within the northeastern portion of the Goleta Slough, adjacent to Henry T. Yang Drive (SBAS 2026).
Mammals (bats)			
pallid bat *Antrozous pallidus*	None/SSC	Low (roosting) Moderate (foraging)	Occasionally forages aerially over the Study Area at night. One CNDDB occurrence from 2017 approximately 0.70 miles west of the Study Area, detected acoustically (Occurrence 431; CDFW 2025a).
yuma myotis *Myotis yumanensis*	None/SSC	Present (foraging) Not Expected (roosting)	CNDDB record (2008) that occurs at More Mesa. Detected foraging during nocturnal survey (Smallwood 2025). There are no suitable roosting sites (e.g., caves, mines, or abandoned buildings) within the Study Area treatment areas, but foraging habitat is present (e.g., riparian corridors).

Species	Status (Federal/State)	Study Area Potential	Reasoning
western mastiff bat *Eumops perotis californicus*	None/SSC	Low (roosting) Moderate (foraging)	Two CNDDB occurrences within five miles of the Study Area, including two occurrences from 2008 that overlap the Study Area at More Mesa (Occurrence 127 and 128; same occurrence locations/date as western red bat below; CDFW 2025a). The species was detected during acoustic surveys in April and August 2008.
western red bat *Lasiurus frantzii*	None/SSC	Low (roosting) Moderate (foraging)	Three CNDDB occurrences within five miles of the Study Area, including two occurrences from 2008 that overlap the Study Area at More Mesa (Occurrence 127 and 128; same occurrence locations/date as western mastiff bat above; CDFW 2025a). The species was detected acoustically during surveys in April and August 2008 on More Mesa.

CDFW 2026b

SBAS = Santa Barbara Audubon Society; SBCFCD = Santa Barbara County Flood Control District

Federal Status

FE = Federal Endangered
FT = Federal Threatened
FPT = Federal Proposed Threatened
FC = Federal Candidate

State Status

SE = State Endangered
ST = State Threatened
SCE = State Candidate Endangered
SSC = CDFW Species of Special Concern
FP = CDFW Fully Protected
WL = CDFW Watch List

Monarch Butterfly

The monarch butterfly (*Danaus plexippus*) is a Federal Proposed Threatened (FPT) insect that is known for their long-distant annual migration. The California overwintering populations overwinter in roost sites that extend along the Pacific coast from northern Mendocino County to Baja California, Mexico. The overwintering season occurs from early October to mid-March. Roosts are in wind-protected tree groves (typically eucalyptus, Monterey pine, or Monterey cypress), with nectar and water sources nearby. The large aggregations are typically in groves that offer wind protection, slightly warmer temperatures, and basking sites. Large aggregations are fairly predictable as monarchs typically use the same sites each year (Meade 1999). Roosting branches are often located above drainages because these areas allow cold air to escape during extreme weather, which helps safeguard butterflies from freezing (Meade 2018).

Proposed critical habitat is designated within the Study Area, extending from Goleta Beach to approximately 0.85 mile northeast along Atascadero Creek (89 FR 100662-100716; USFWS 2025). Four known overwintering sites overlap the Study Area: Xerces Site #2765, #3174, and #3177, which are verified sites per Xerces, and Xerces Site #2806, which is a potential site per Xerces (Xerces 2026). These overwintering sites are discussed in further detail below.

- **Xerces site #2765 (Atascadero Creek, Santa Barbara)** is within the southeastern portion of the Study Area, south of Atascadero Creek, and adjacent to the La Goleta Facility, at approximately 34.422839, -119.820035. The site consists of a eucalyptus grove, likely planted to shield the gas facilities (CDFW 2025). The most recent observation recorded was 968 monarchs in 2023. The highest recorded count at this site was in 1997 (approximately 20,000 monarchs recorded), and counts remained in the thousands each year until 2002 (4,000 monarchs in 1999, 8,912 in 2000, 5,470 in 2001). No monarchs were recorded from 2002 to 2012. Monarchs were again observed in 2013 and fluctuated from thousands to hundreds each year until the most recent observations in 2023 (CDFW 2025, Xerces 2026). The proposed critical habitat described above overlaps with this overwintering site.
- **Xerces site #2806 (Santa Barbara Orchid Estate)** overlaps with a portion of the eastern section of the Study Area, south of Atascadero Creek along Orchid Drive, at approximately 34.422749, -119.806523. The site consists of a dense stand of various native and non-native trees and vegetation surrounded by residential development and roads. No monarchs have been observed at this site in over 20 years, and no suitable roosting or overwintering habitat was observed at the site in 2016 (CDFW 2025).
- **Xerces site #3174 (Boys and Girls Club, Goleta)** at the northeast corner of the Study Area, behind the Goleta Community Center, formerly the Boys and Girls Club, at approximately 34.432525, -119.824757. The site consists of a stand of eucalyptus surrounded by commercial development. The most recent observation recorded was 33 monarchs in 2023. The highest count at this site was 140 monarchs observed in 2016 prior to development of adjacent housing (CDFW 2025, Xerces 2026).
- **Xerces site #3177 (More Ranch Road, Near Goleta Beach)** is within the southern portion of the Study Area, approximately 0.35 mile east of the Goleta Slough mouth, at approximately 34.417486, -119.816266. The site consists of small clumps of eucalyptus along the cliff edge. The most recent observation recorded was 31 monarchs in 2017. Four thousand five hundred monarchs were recorded in 2000, and then numbers drastically declined in the years following (30 monarchs observed in 2002) (CDFW 2025, Xerces 2026).

Suitable habitat for overwintering may be present within the overwintering sites that overlap with the Study Area, as described above. Overwintering populations have been observed as recently as 2023 within the known overwinter sites, as discussed above. Individual monarchs are present within the Study Area and may transit through the Study Area. Eucalyptus trees within the Study Area are limited, as the Study Area consists primarily of tidal areas and pickleweeds mats. Individual monarchs are present within the Study Area and may overwinter within suitable habitat in the Study Area.

Tidewater Goby

TWG is a federally listed endangered species by the USFWS and a CDFW SSC. TWG is a small, elongate, gray-brown fish rarely exceeding two inches in length. TWG is a short-lived species; the lifespan of most individuals appears to be approximately one year (Swift et al. 1989). TWG populations are typically sequestered into local lagoon environments. However, although TWGs have rarely been captured in the marine environment (Swift et al. 1989), individuals can disperse between lagoons and estuaries in close proximity. TWG is benthic (e.g., lives on the bottom of a water body) and lives in habitats that include brackish, shallow lagoons and lower stream reaches where the water is relatively still but not stagnant (Love and Passarelli 2020; Wang 1984; Irwin and Soltz 1984; Swift et al. 1989; Swenson 1999). TWGs prefer sandy substrate for breeding, but can also be found on rocky, mud, and silt substrates (USFWS 2006).

TWG was listed as an endangered species by USFWS in 1994 and critical habitat was re-designated in 2008, which did not include the Goleta Slough or its tributaries. TWG final critical habitat is designated in the tidally influenced portion of the Goleta Slough, and USFWS considers lower trial stream reaches of the Goleta Slough suitable and accessible to TWG, including San Jose, San Pedro, and Atascadero creeks (78 FR 8746-8819; USFWS 2019). The physical and biological features that are present in the GSEMA include water depth [physical and biological feature 1], substrate [Physical and Biological Feature 1a], and seasonal sandbar mouth [physical and biological feature 1c] (USFWS 2019).TWG was listed as extirpated from the Goleta Slough in the Recovery Plan for the species (USFWS 2006). Since 2008 it has been observed recently throughout most sections of the Goleta Slough and is considered present in tidal areas of the Study Area where critical habitat is designated (CDFW 2025a, Rincon 2023, 2024, and 2025).

Southern California Steelhead

Southern California steelhead Distinct Population Segment (*Oncorhynchus mykiss irideus* pop. 10; steelhead) is a FE and SE species. The range of the species is from the Santa Maria River along the San Luis Obispo/Santa Barbara County line in the north to the Tijuana River just north of the United States/Mexico border in the south. Southern California steelhead (steelhead) requires cool, clear, well-oxygenated water with sufficient food, but they have adapted to living under highly variable environmental conditions. Important aquatic environmental factors for steelhead include temperature, dissolved oxygen, salinity, and water depth.

NMFS designated critical habitat for steelhead in portions of the Goleta Slough Complex including San Jose, San Pedro, Maria Ygnacio, and Atascadero creeks. Habitat quality for steelhead within the Goleta Slough Complex varies greatly within the watershed. Little data on steelhead spawning timing exists for the Goleta Slough, although both spawning timing and distribution within the basin is related to timing, frequency, and duration of sandbar opening and winter flow conditions. Adult steelhead occurrence in the Goleta Slough is necessarily limited to periods when the estuary is open, at which point adults are expected to use it as a migration corridor to the upper watershed as soon as water depth in the river allows. Out-migration of juveniles from natal streams to the ocean, sometimes with substantial residence in estuaries, while undergoing physiological and morphological changes for life in the marine environment are termed smolt). Timing of smolt outmigration depends on multiple environmental factors, including streamflow and breaching of the sandbar at the estuary mouth, which provide connectivity between freshwater habitats and the ocean NMFS 2012, Rincon et al. 2016).

Juvenile steelhead may rear for extended periods within upstream freshwater habitats of the Goleta Slough depending upon seasonal variations in rainfall that control the extent of wetted channel and connectivity from the Goleta Slough to upstream locations. There are no documented CNDDB records of this species within five miles of the Study Area (CDFW 2025). However, there are multiple historical sightings of the species within the Goleta Slough Complex (Stoecker et al. 2002). Juvenile steelhead have been reported in upstream habitats of Atascadero, San Jose, San Pedro, and Tecolotito creeks as well as in some of their tributaries including West Fork San Jose Creek, and Maria Ygnacio and San Antonio creeks which flow into Atascadero Creek (Stoecker 2002). Adult steelhead have been reported in the lower sections (south of Highway 101) of San Pedro, Atascadero, and Maria Ygnacio creeks (Stoecker

2002). In 2013, two adult steelhead and numerous juveniles were observed by NMFS staff in Atascadero Creek below the drop structure (i.e., grade control) at the Patterson Avenue Bridge (NMFS 2013).

Water quality in Goleta Slough supports steelhead rearing during winter and spring but becomes unsuitable in summer due to high temperatures and salinity, regardless of whether the sandbar is open or closed (Rincon et al. 2016). Unlike more northerly California lagoons where freshwater inflows and stratification create summer refugia for steelhead (e.g., Scott Creek lagoons, Pescadero Creek, and San Gregorio Creek), Goleta Slough lacks sufficient freshwater input and beneficial stratification to moderate poor summer conditions. As a result, Goleta Slough does not appear capable of supporting extended summer lagoon rearing for steelhead, though brief rearing may occur during fall, winter, or spring migration periods (Rincon et al. 2016). Therefore, steelhead have a moderate potential to occur within the Goleta Slough complex and creeks in the Study Area.

Southwestern Pond Turtle

Southwestern pond turtle (SWPT; *Actinemys pallida*) is a FPT species and CDFW SSC. SWPT occur in a variety of man-made and natural aquatic habitats, including rivers, creeks, estuaries, lakes, ponds, marshes, and reservoirs. SWPT, during the day, bask on land or near the water on logs, branches, or boulders. Females nest in adjacent upland areas within 328 feet of aquatic habitat, although nests as far away as 1640 feet have occasionally been reported. Both sexes will move into adjacent upland habitat to estivate (enter summer dormancy) when aquatic habitat dries up. The species can persist, at least over moderate periods of time, in highly modified habitats with high human traffic and/or little basking substrate (Thompson et al. 2016).

There are two recorded occurrences of SWPT overlapping the eastern portion of the Study Area along Atascadero Creek, including one occurrence (Occurrence 894) from 2015 and another historical occurrence (Occurrence 963) from 1982. Additionally, three recorded occurrences less than 1.5 miles to the east in Atascadero Creek in a mitigation area managed by SBCFCD (CDFW 2025a, CCC 2025). A pair of SWPT was also documented in 2018 within the Study Area, approximately 0.3 mile upstream of the Goleta Slough mouth, south of SR 217 (iNaturalist 2025). SWPT has a high potential to transit through the Study Area from SBCFCD mitigation areas but has a low potential to be found breeding within the Study Area.

Special-Status Birds

Sensitive bird species that have been observed foraging or soaring in the Study Area but lack suitable nesting habitat are not presumed to be present. The discussions below include only those species anticipated to nest in treatment areas.

Belding's Savannah Sparrow

BSS is a FE species that is a rare subspecies of the savannah sparrow. It is distinguished from the savannah sparrow by having heavier and darker streaking, and a smaller beak profile. As with most ground-dwelling species, this bird is inconspicuous and blends well with its environment. Breeding territories can be very small and the bird's nest semi-colonially or locally concentrated within a larger block of habitat. They can be difficult to count accurately since they are secretive and forage throughout a marsh, often well away from nesting sites (Zembal and Hoffman 2015). BSS is a small, brown and white streaked, non-migratory songbird in the New World sparrow family, Passerellidae. They measure about 4.5-7 inches and have a thinner crown stripe than other sparrows, with a yellow patch in front of the eye. The CDFW listed this bird in 1974 as endangered. BSS occurs along coastal areas of Southern California and Baja California in coastal salt marshes and associated mudflats and salt flats. BSS are largely associated with pickleweed and utilizing the low dense habitat for foraging and nesting. This species forages throughout the vegetation within marshes, along mudflats, and occasionally on adjacent sand dunes (Zembal et al. 1988). BSS primarily eat insects and marine invertebrates, but will also eat seeds of grasses and tips of pickleweed.

Incubation within the subspecies' range may occur anywhere from mid-March to mid-July, although the peak is probably in April (Kiff and Irwin 1987). Preferred nesting habitat for BSS includes dense stands of pickleweed low to the ground but in the upper region of salt marshes that flood only during extremely high spring tides. In the Study Area, BSS nests are largely limited to within and adjacent to pickleweed (*Salicornia pacifica*) marsh and adjacent low-growing grass and herbaceous communities, which in the above-mentioned basins include areas dominated by alkali heath (*Frankenia salina*) and saltgrass (*Distichlis spicata*), and small areas dominated by beardless wildrye (*Leymus triticoides*). Nests are typically placed on or near the ground. Both adults incubate for 12 to 13 days and feed young. Clutch size is two to six eggs and pairs often produce one to two broods per year. Young fledge in eight to 11 days.

BSS resides year-round in Southern California coastal salt marshes. BSS is a non-migratory sparrow subspecies; this songbird is state-listed endangered. The BSS inhabits coastal marshes, from Santa Barbara south through San Diego County. It is one of only two wetland-dependent avian species that reside year-round in the coastal salt marshes of Southern California. From 1973 to 2015, focused surveys of Southern California estuaries, including the Goleta Slough, were conducted and summarized every five years by CDFW.

Loss and degradation of about 75 percent of coastal wetlands led to a dramatic decline in BSS numbers. However, a 2015 census found that the BSS population has increased by 11.3 percent since the 2010 population estimate (Zembal and Hoffman 2015). The most critical measure to protect BSS remains to effectively protect coast wetlands from degradation due to overgrazing, recreational use, channelization, and development. In most instances, narrow habitat belts and edges near uplands and freshwater marsh are simply not occupied by BSS due to competition and predation. Unless the upper marsh belt is much greater than 32 feet across, it will either not be occupied or occurrences will be extremely spotty (Zembal and Hoffman 2010).

At Goleta Slough, this species nests in pickleweed marsh and adjacent habitats, and forages on nearby beaches and in grass and forb-dominated habitat on or near the SBA (Dudek 2012). Studies conducted for Goleta Slough mouth management have found that suitable habitat for BSS decreases significantly as floodwater water surface elevation exceeds 5.5 feet for prolonged periods, higher water surface elevation negatively impacts existing BSS habitat within Goleta Slough (Rincon et al. 2016).

There are multiple recent recorded occurrences of BSS from 2020-2025 in the Study Area in suitable habitat in the Goleta Slough (SBAS 2026, Storrer 2025). Outside SBA tidal Basins territorial BSS have also been recorded occasionally along Tecolotito Creek upstream of Basin G and in areas of herbaceous vegetation outside the tidal marsh but within SBA property. A pair with a juvenile was along lower Atascadero Creek just east of Goleta Slough in May 1993 and five individuals were there in March 1994 (Lehman 2024).

The 2016 Goleta Slough Mouth Management Biological Assessment describes the Belding Savannah sparrow population in the SBA tidal basins, as follows:

> *A nesting population of Belding Savannah Sparrow, (Passerculus sandwichensis beldingi), a state endangered species. Other than one or two territories present irregularly at Devereux Slough, approximately 1.25 miles west of Goleta Slough, the population at Goleta Slough is the furthest northwestern occurrence for the subspecies. Periodic surveys (approximately every five years) have yielded counts of between 52 and 68 territories since 2001, although more extensive surveys in 1992 and 1994 recorded 117 and 140 pairs, respectively (Zembal and Hoffman 2010, Compton 2015, Holmgren and Burnell 1992, Holmgren and Kisner 1994).* (GSMC 2015 Page 2-81, Rincon et al. 2016).

The latest CDFW survey (2015) indicated a total of 52 territories within the Goleta Slough loosely demarcated by territorial behavior such as singing, scolding, extended perching together of mates, nest building, feeding young, aerial chases, and prolonged posting under certain circumstances (Zembal and Hoffman 2015)

While outlying territories occur in most years, the species is virtually confined to Basins A/H, B/C, D, E/F, G, and L/M (with most territories occurring in A/H and B/C). During surveys in 1987, 1992, 1994, 2001, and 2006, densities of BSS territories were highest in Basin A/H and Basin B/C, and D, which are relatively large, tidal areas dominated by pickleweed (Lehman 2024, Holmgren and Brunell 1992, Holmgren and Kisner 1994, SBAS 2026, Storrer 2024). BSS territories were observed during District activity monitoring during the 2026 nesting season in Basin A/H and Basin B concentrated in high marsh habitat, shrub edges, and elevated areas.

Yellow-Breasted Chat

The yellow-breasted chat is a CDFW SSC that occurs as a migrant and summer resident, primarily from late March to late September and breeds from late April through early August. The species prefers nests on understory and shrubby riparian vegetation, with nesting habitat usually restricted to the narrow border of streams, creeks, sloughs, and rivers, and seldom forms extensive tracks. There are no known CNDDB occurrences within five miles of the Study Area (CDFW 2025a). In 2021 a transient or foraging individual was detected in the Study Area in the Old San Jose Creek Riparian Corridor (Rincon 2021). The species was detected breeding in 2023 at the Arroyo Burro Open Space, approximately 2.5 miles east of the Study Area (SBAS 2026). The yellow-breasted chat has a low potential to nest given the lack of narrow width of riparian vegetation and high ambient disturbance in the Study Area, but may forage or migrate though the Study Area.

Yellow Warbler

The yellow warbler is a CDFW SSC that is a small (approximately 4.7-5.1 inches long) uniformly yellow songbird with a medium-length tail, rounded head, and a straight thin bill. Males are a bright, egg-yolk yellow with reddish streaks on the underparts. Both sexes flash yellow patches in the tail. The face is unmarked, accentuating the large black eye. Yellow warblers are frequently found nesting and foraging in willow shrubs and thickets, and in other riparian plants including cottonwoods, sycamores, ash, and alders. There are no known CNDDB occurrences within five miles of the Study Area (CDFW 2025). Several detections are recorded from 2023 at the GWSD and UCSB campus, within and adjacent to the Study Area (SBAS 2026). The yellow warbler has a high potential to nest and/or occur as a transient, foraging, or migratory species.

Special-Status Raptor Species

White-Tailed Kite

White-tailed kite (*Elanus leucurus*), a state Fully Protected (FP) species that breed regularly along the Santa Barbara coastline. This species nests in trees, usually with a dense canopy, but nest trees can vary from single, isolated trees to trees within large woodlands, including (in order of frequency used) oaks, pines, Monterey cypress, eucalyptus, and willows (Holmgren 2000). Nest and roost trees are typically found in woodlands next to grasslands, meadows, or marshes, which serve as feeding areas. The Study Area provides suitable nesting and roosting habitat for the species, as large eucalyptus are present within the Study Area. There are four known CNDDB occurrences within five miles of the Study Area, including one occurrence from 2009 that overlaps with the Study Area at More Mesa (Occurrence 179, CDFW 2025). The Santa Barbara Breeding Bird Study documents many recent detections within More Mesa, including nesting activity in 2025 (SBAS 2026). Winter roosting has occurred in willows near Area K (Dudek 2017). This species is present in all life phases within the Study Area.

Cooper's Hawk

The Cooper's hawk (*Astur cooperii*) is a CDFW Watchlist species that typically inhabits woodlands and forest edges but can also be found in urban parks and neighborhoods where trees are present. Nests are constructed 25 to 50 feet high in a variety of tree species, including pines, oaks, beeches, and spruces. Nests are made of sticks and are often lined with bark flakes and green twigs. Cooper's hawks are aerial

predators that feed primarily on medium-sized birds, such as mourning dove (*Zenaida macroura*), American robin (*Turdus migratorius*), California quail (*Callipepla californica*), and European starling (*Sturnus vulgaris*). In addition to preying on adult birds, Cooper's hawks will also occasionally rob nests and hunt rabbits, rodents, and bats (Cornell Lab of Ornithology 2026a). Suitable foraging habitat for the species is present throughout the Study Area, and suitable nesting habitat for the species exists in eucalyptus and coast live oak trees in the Study Area. There are four known CNDDB occurrences within five miles of the Study Area, including one occurrence from 2009 that overlaps with the Study Area at More Mesa (Occurrence 137, CDFW 2025). The Santa Barbara Breeding Bird Study documents several recent detections within More Mesa, including nesting activity in 2022, and within the northeastern portion of the Goleta Slough, adjacent to Henry T. Yang Drive (SBAS 2026). The Cooper's hawk has a high potential to forage and nest within the Study Area.

Special-status Bat Species

Pallid Bat

The pallid bat (*Antrozous pallidus*) is a state SSC that occurs over a wide variety of habitat types, including deserts, grasslands, shrublands, woodlands, and forests. While it is most common in open, dry habitats with rocky areas for roosting, it can be found roosting under bridges and in some areas in old structures such as barns. They are very sensitive to disturbance of their roost sites, and these sites must protect bats from high temperatures. The pallid bat is a resident species that occurs throughout the state, commonly at elevations below 6,000 feet. Marginally suitable woodland habitat is present along the woodland areas at the southern portion of the Goleta Slough. However, the woodland areas are adjacent to a heavily trafficked road (Henry T. Yang Drive) within UCSB and Atascadero Creek which was affected by a 2022 fire and is subject to anthropogenic disturbance. No suitable shrubland, rocky and open dry areas, or low disturbance roosting areas are present within the Study Area. There is one CNDDB occurrence from 2017 approximately 0.18 miles west of the Study Area, west of Storke Road and north of Coal Oil Point detected acoustically during a survey for a restoration project (Occurrence 431; CDFW 2025a). The pallid bat has a low potential to roost since the Study Area is subject to disturbance and high potential to forage within the Study Area.

Western Red Bat, Western Mastiff Bat, Yuma Myotis, and Hoary Bat

Other bat species that may occur within the Study Area include the western red bat (*Lasiurus frantziii*), western mastiff bat (*Eumops perotis californicus),* Yuma myotis (*Myotis yumanensis*), and hoary bat (*Lasiurus cinereus*). The western red bat and western mastiff bat are state SSC, and Yuma myotis and hoary bat are not state or federally protected. The western red bat is locally common in California from Shasta County west of the Sierra Nevada/Cascade crest and deserts. This species is found in a variety of habitats, from grasslands, woodlands, and agriculture (Zeiner et al. 1988). This species typically roosts in trees and occasionally in shrubs, primarily within edge habitats adjacent to streams. Western red bats are highly migratory compared to other bat species, and their winter range includes western lowlands and coastal regions south of San Francisco. The western mastiff bat is an uncommon resident of the southeastern San Joaquin Valley and Coastal ranges. The species typically occupies open, semi-arid to arid habitats and is closely associated with rugged terrain and large expanses of open airspace that facilitate its high-altitude, fast flight foraging strategy (Zeiner et al. 1988). Day and night roosting sites include crevices in cliff faces, rock outcrops, high buildings, large trees, and tunnels. The species exhibits high roost fidelity and is sensitive to disturbance at roost sites, particularly during the maternity season. Yuma myotis are commonly associated with riparian corridors, open water, and adjacent upland habitats where they forage extensively over streams, ponds, and other water bodies, typically roosting in crevices, bridges, buildings, and occasionally trees. Hoary bats are widespread but generally solitary tree-roosting bats that occur in forested and woodland habitats, including riparian areas, where they roost in the foliage of large trees and migrate seasonally across much of western North America.

A More Mesa acoustical bat detection survey in April through August in 2008 detected four bat species SSC: The western mastiff, western red bat, Yuma myotis, and hoary bat (CDFW 2025a, Rincon 2010). However, no bat roosts were recorded, nor did the acoustic data indicate that specific roosts were present (Rincon 2010).

In addition, one CNDDB occurrence from 2017 for the western red bat approximately 0.18 miles west of the Study Area, west of Storke Road and north of Coal Oil Point was detected acoustically during a survey for a restoration project (Occurrence 431; CDFW 2025a). There is marginal roosting habitat within large trees, such as cottonwood, sycamore, or willow trees, along the Atascadero Creek riparian corridor near More Mesa within the Study Area. However, the area is subject to human disturbance from the bike path, agriculture, and the SoCalGas Facility and was affected by the 2022 fire. Foraging habitat for these bat species is present and may provide roosting habitat for hoary bat (in foliage of both coniferous and deciduous trees), and Yuma myotis (under tree bark). The special-status bats have a low potential to roost and are high potential to forage within the Study Area.

1.5.4 Birds Protected by the California Fish and Game Code and Migratory Bird Treaty Act

The Study Area contains habitat that can support nesting birds, including raptors, protected under CFGC Section 3503 and the Migratory Bird Treaty Act (MBTA; 16 United States Code Sections 703–712). Potential nesting sites for raptors within the Study Area are located within the woodland, eucalyptus grove, and riparian habitats. Other species of birds are also likely to utilize the shorter chaparral shrub habitat (i.e., coyote brush) within the Study Area.

1.5.5 ESHA and Sensitive Natural Communities

The CCC has long recognized that parts of the Goleta Slough provide sensitive habitat areas. The Goleta Slough is one of the largest remnant coastal wetlands in this part of California and supports a diverse set of habitats, including several types of freshwater, estuarine, coastal, riparian, and upland areas.

The primary CDFW Sensitive Natural Community occurring in the Study Area and mapped by CNDDB is Southern Coastal Salt Marsh, and summer mosquito habitat countywide is southern coastal salt marsh. According to Dudek (2012a), this sensitive natural community occurs in the Goleta Slough in the form of four vegetation communities: alkali heath marsh, pickleweed mats, salt grass flats, and salt marsh bulrush These communities, particularly pickleweed mats, provide the primary nesting habitat for the BSS, listed as endangered under the California Endangered Species Act. Creeks and riparian corridors are vegetated in part by arroyo willow thickets, which is a CDFW Sensitive Natural Community (CDFW 2026).

Study Ares ESHA is designated in all areas mapped as waters/wetlands under Figure 1 by the City of Santa Barbara, UCSB, City of Goleta, and the County. Upland ESHA is not affected by District activities and is not discussed further.

1.5.6 Aquatic Resources

The Study Area treatments areas shown in Figure 1 are based on the National Wetlands Inventory and are potentially under the jurisdiction of the USACE, RWQCB, CDFW, and CCC. Since the National Wetland Inventory (NWI) mapping the SBA Goleta Slough Tidal Restoration Demonstration Project created both full and partial tidal regimes within the E/F basin area. No formal wetland delineation was prepared because the activity does not include ground disturbance, fill, excavation, or habitat modification; activities are limited to surveillance and larvicide application with vehicles restricted to existing routes and interior access on foot.

1.5.7 Wildlife Movement

The Goleta Slough is a coastal wetland ecosystem that functions as habitat for resident and migratory wildlife, including birds associated with the Pacific Flyway, and contains salt marsh vegetation communities dominated historically by pickleweed (*Salicornia* spp.). The Goleta Slough supports diverse wildlife use and has long been recognized as a biologically productive tidal marsh system in Southern California.

Wildlife migration corridors connect habitat areas and allow physical and genetic exchange between otherwise isolated animal populations. These corridors may be local—linking foraging and nesting or denning areas—or regional. In contrast, "habitat linkages" are corridors with continuous native vegetation that provide cover and forage for temporary use by ground-dwelling species (Padre 2010). Such corridors are vital to regional ecology, supporting genetic flow and allowing animals to shift territories as conditions change. The Goleta Slough and its tributaries may serve as important movement routes for fish and wildlife traveling between the Pacific Ocean, coastal areas, upper watersheds, and the Santa Ynez Mountains. The riparian vegetation occurring along these creeks could also provide migration habitat for upland species and nesting birds; however, due to the constructed channelization of these creeks, intermittent flows, and disturbed creek habitat up and downstream of the work area, it is expected that the Study Area contains low quality, largely transitory corridor habitat for aquatic species and amphibians (Rincon 2025).

At the regional/landscape level scale, the Study Area is not within any mapped landscape models, such as an Essential Connectivity Area or Natural Landscape block in the *California Essential Habitat Connectivity Project: A Strategy for Conserving a Connected California* (Spencer et al. 2010). The *City of Goleta Creek and Watershed Management Plan* maps wildlife corridors locally along creeks.

The Study Area includes major creeks, including Atascadero, Los Carneros, Maria Ygnacio, San Jose, San Pedro, and Tecolotito creeks, as well as waterways and the Goleta Slough mouth, which opens to the Pacific Ocean and may serve as a wildlife movement corridor. Surrounding vegetated areas at the western end of the Study Area, adjacent to the Camino Corto Open Space, provide suitable small-scale wildlife movement corridors for wildlife to travel locally and are important in linking non-contiguous or fragmented wildlife habitats. The Pacific Ocean is directly to the south of the Study Area and could also serve as a wildlife movement corridor. The Study Area is surrounded by urban development, including Highway 101 to the north, UCSB to the south and west, SBA and residential and commercial development to the east, which make it less ideal as a wildlife movement route. The Goleta Slough provides habitat for migrating birds along the Pacific Flyway.

1.6 Coastal Impact Analysis

Under modern IMM, mosquito control emphasizes source reduction and habitat BMPs (reducing standing water, reducing stagnation, improving flow, and managing vegetation) and targeted larval control, using least-toxic measures and integrated planning with land managers. However, the IMM BMPs for source reduction such as hydrological modification or habitat management such as vegetation removal is not proposed or conducted by the District. This analysis includes incorporation of District proposed BMPs into the activity description (Section 3).

1.6.1 Special-Status Species

Potential impacts include temporary disturbance during field access and localized disruption of sensitive wildlife if access is not properly managed. Routine foot access and periodic larvicide applications could disturb plants, nesting birds or other wildlife if conducted near active nests, roosts, or sensitive use areas.

Special-Status Plant Species

Southern tarplant, Santa Barbara honeysuckle, estuary seablite, and Coulter's goldfields are known to occur or have a high potential to occur within the treatment areas in GSEMP Study Area.

No heavy equipment, source reduction, or vegetation trimming is proposed. Surveillance activities occur along existing access routes that have already been established and are regularly maintained. Direct impacts could occur from impact by foot or where adjacent to the road by vehicle while accessing treatment areas. However, impacts from technicians on foot and from minor trimming of vegetation would be less than significant due to the negligible area involved, and that special-status individuals would not suffer mortality or be removed from foot or vehicle access. Impacts would be further reduced through District BMPs, which include vehicle restrictions under SCP-01, worker education SCP-05, ESHA avoidance SCP-06, and resource mapping under SCP-07. District BMPs would avoid indirect impacts to special-status plants by preventing the introduction of invasive species (SCP-07).

With incorporation of District BMPs into the Plan, direct and indirect impacts to special-status plants will be less than significant.

Special-Status Animal Species

The District conducts routine mosquito surveillance in and around Goleta Slough to monitor mosquito populations and detect any mosquito-borne diseases. Key surveillance methods include:

- **Larval Surveys and Treatment Access:** Trained technicians regularly inspect aquatic sites for mosquito larvae. Using long-handled dippers, they sample standing water in salt marsh pools, ditches, and other mosquito breeding spots. Larval counts and species are recorded. Dipping is minimally invasive since it involves the gentle scooping of water and causes negligible disturbance. Technicians typically access sites on foot via existing trails, levees, or by small boat in channels, avoiding impacting of vegetation or bottom sediments as much as possible. District surveillance and treatment (foot traffic, dispersal) could temporarily disturb wildlife, including nesting birds, if conducted in proximity to active nests or sensitive areas. Activities would be conducted in accordance with the BMPs relating to agency communication, pretreatment screening, environmental training, disturbance minimization (SCP-05), and nesting bird avoidance (SCP-12), tidal marsh specific BMPs (SCP-10), and saltmarsh nesting season mapping and monitoring (SCP-11) as detailed in IMVMP Section 5.
- **Adult Trapping:** Though adulticide spraying is excluded from this study, adult mosquito traps are used for surveillance. Carbon dioxide-baited light or dry-ice traps and BG-Sentinel traps are placed strategically (e.g., at the wetland margin or near public areas) to sample adult mosquito populations. These traps run on battery power and modest light; they are small (half gallon-sized) and placed in open spots, causing no habitat damage. Some non-target insects (like midges or moths) can be attracted and caught, but in very low numbers relative to their populations. The traps do not use broad-spectrum sticky glues or pesticides; insects are typically collected alive. Thus, the impact on non-target terrestrial insects from trapping is minor and localized (traps might remove a few dozens of moths or flies over a night in an area that supports thousands).

Larval Treatment Toxicity

The District implements larval control treatments using environmentally compatible larvicides that target mosquito larvae in the water. The primary active ingredients in the larvicides, *Bacillus thuringiensis israelensis* (Bti), *Bacillus sphaericus* (Bs), methoprene are described in Section 2. The foremost concern is whether these larvicides, which are introduced into aquatic environments, could harm other aquatic organisms like fish, amphibians, aquatic invertebrates, or the food base for birds. All four active ingredients in the larvicides used in Goleta Slough are either highly target-specific or of low toxicity to non-targets at operational concentration.

- **Bacterial Larvicides (Bti and Bs):** These natural bacterial products are extremely specific to mosquito and closely related fly larvae. Bti and Bs spores produce proteins that, when ingested by filter-feeding

insect larvae, destroy the gut lining of mosquitoes and certain biting flies, causing larval death. Importantly, most other organisms do not have specific gut conditions to activate these toxins. As a result, Bti and Bs show minimal to no toxicity on non-target aquatic life such as fish, amphibians, or aquatic beetles/bugs. Some non-biting midge larvae (Chironomidae, close relatives of mosquitoes) can be slightly affected by high doses of Bti/Bs, but field studies indicate no lasting impact on midge populations under normal use rates (CDPH 2023, USEPA 2021). Bti/Bs do not harm predatory aquatic insects (dragonfly nymphs, beetles), crustaceans, or mollusks at field application rates. For special-status fish like the TWG or steelhead, the bacterial larvicides are essentially non-toxic. The EPA has determined Bti has no significant direct effect on fish or amphibians Bti and Bs must be ingested by mosquito larvae to be effective. Their toxicity is limited to certain members of the order Diptera (mosquitoes, some flies). They do not affect vertebrates, including fish, amphibians, birds, mammals, or bats. They degrade naturally in aquatic environments and do not bioaccumulate. Because Bti/Bs act only on larvae with specific digestive physiology, most aquatic invertebrates remain unaffected. Bacterial larvicides showed good results for sustained control with similarly limited environmental effects, except for spinosad (see below) (Lawler 2017, Cardno 2013).

- **Insect Growth Regulator (Methoprene**): Health agencies, the public and environmental groups have especially debated the use of methoprene because some studies have shown toxic effects on non-target organisms (Lawler 2017). Methoprene is a synthetic analog of an insect hormone that prevents mosquito larvae from maturing to adults. It is highly selective to insect growth; most vertebrates and plants lack the hormonal pathways that methoprene affects. Within the aquatic environment, methoprene has a half-life of a few hours to a couple of days, but is sometimes applied in an extended-release format, which may persist for many days or even months in the environment. At the label application rates used in the field (e.g., ~0.5 ppb or less in water), methoprene has little to no acute toxicity to fish, amphibians, or aquatic mammals. For example, bluegill sunfish have an LC50 (lethal concentration for 50% of individuals) around 4.6 million µg/L, orders of magnitude above the ~0.5 µg/L used for mosquitoes. Some sensitive aquatic invertebrates (a few species of zooplankton, larval stages of some other crustaceans, certain species of midges, mosquitoes, and related flies) are affected by methoprene; by design, it disrupts their life cycle. Studies in natural habitats have not documented population reductions except in small Diptera (flies) (Lawler 2017). There could be slight temporary reductions in populations of non-biting midge larvae in treated pools. However, these insects reproduce rapidly and can recolonize from untreated areas, so any decreases in their numbers are short-lived and localized. While in laboratory trials some crustaceans and insects that were similar or smaller in size to mosquitoes showed mortality or developmental changes in response to exposures similar to those expected in mosquito control, field studies have not detected negative impacts of methoprene. Studies show no significant change in overall invertebrate community structure in wetlands and marine area following methoprene treatment at recommended doses (Cardno 2013, Lawler 2017).
- **Biorational Insecticide (Spinosad):** Spinosad, derived from a soil bacterium, is a larvicide that targets a broad range of insect larvae via neurotoxicity. It is effective on mosquito larvae and some other pests. Spinosad is more toxic to non-target insects than Bti/Bs, but its use in mosquito control is limited and highly controlled. Spinosad is typically formulated in micro-doses (e.g., 0.5–1 ppm in water) and used sparingly in rotation with Bti/Bs to prevent resistance. At these levels, spinosad has low to moderate toxic effects on certain aquatic invertebrates (e.g., some crustaceans or aquatic stages of insects), but the key is its rapid environmental degradation. Spinosad breaks down quickly in sunlight and under warm conditions its half-life in water is on the order of hours to days. This means non-target organisms experience only brief exposure. Research and the District's Program Environmental Impact Report (PEIR) found no long-term impacts on aquatic invertebrate populations from spinosad when applied per label; any initial reductions in susceptible invertebrates are followed by quick recovery due to recolonization and the short persistence of the compound. Spinosad is considered low in toxicity to fish and amphibians; and while highly toxic to bees in laboratory exposure, it becomes practically nontoxic to adult bees after a few hours once dry. Since spinosad is applied to water bodies (not flowering plants) in this program, exposure to pollinators is minimal to none. Overall, spinosad's short-

lived environmental profile, non-bioaccumulative properties, and usage in limited areas ensures that non-target impacts are constrained and not significant.

The larvicides used are environmentally selective and applied in a manner that avoids significant harm to non-target aquatic organisms. This conclusion is backed by empirical evidence: for instance, a multi-year monitoring study across California vector control programs found no significant toxicity in water samples and no observable impact on fish or aquatic invertebrates following larvicide applications at recommended rates (compiled under Cardno 2013). The reduced environmental risk of using these larvicides is further reinforced by using label-required, untreated buffer zones adjacent to flowing water in some situations (though the Goleta Slough's channels are only treated mouth is closed, adjacent open coast waters would not be directly treated).

Food Web

A related consideration is whether reducing mosquito larvae populations affects the food base for predators (like fish or amphibians), or whether any sublethal pesticide exposure could impact special-status species prey availability. The effect of suppressing a species depends on whether its functions are distinct or redundant with other taxa, considering the roles it fills across both space and time. If a species filling an ecological role is dominant or unique, larger effects of suppressing it are likely than if it has low abundance and its functions are redundant with other taxa (Lawler 2017).

Predators of mosquitoes are generally dietary generalists that utilize a wide variety of aquatic and terrestrial invertebrate prey; therefore, localized reductions in mosquito abundance resulting from larval control are not expected to measurably affect food-web function or predator populations (Merritt et al. 1992; Batzer and Wissinger 1996; Walton 2007). Bacterial larvicides leave non-mosquito species unaffected, preserving alternate prey (Bti does not kill crustaceans, beetles, worms, etc.). Even mosquito fish consume many other types of prey, although they are sometimes said to be specialists (Lawler 2017). Localized reductions in mosquito abundance are not expected to affect overall predator populations due to their broad foraging ranges and use of alternative prey (compiled under Cardno 2013).Therefore, the food web impacts are minimal and predators in the Goleta Slough continue to have ample alternative food sources (chironomid midges, fly larvae, small crustaceans, etc.).

No direct or indirect impacts on special-status species, ESHA, aquatic resources, or wildlife movement are expected from larvicide. No direct or indirect impacts on special-status species are expected from larvicide use. For example, the TWG feeds on small aquatic invertebrates and detritus; as noted, Bti and methoprene have little effect on those prey organisms. The endangered gobies themselves were tested in risk assessments and found to not be adversely affected by label larvicide concentrations. Similarly, bird species like the BSS or waterfowl that may ingest treated water or prey are not at risk – the larvicides do not bioaccumulate or persist in prey. Bioaccumulation is not a concern with the larvicides used: Bti and Bs are non-living toxins that eventually break down, methoprene is quickly metabolized in the environment and in organisms (and it's applied in low doses), and spinosad is not known to accumulate in animal tissue (it degrades to innocuous metabolites).

Special-Status Insects

Special-status insects, if present, could only potentially be affected by the emergency use of adulticides. Monarch butterfly roosts in eucalyptus groves would be unaffected by surveillance and treatment since no tree trimming or removal would occur. Any impacts to special-status insects would be reduced through adherence to existing regulations for application: BMP-06 restricting adulticide use and BMP-05 interagency communication, and SCP-04 environmental training, and SCP-06 ESHA and resource mapping database.

Special-Status Aquatic Species

Channels that have substantial tidal flow and inundation would not support mosquitoes and thus would not need to be treated. Fish can also escape technician foot traffic since they are mobile. Thus, fish would not be directly affected.

The TWG feeds on small aquatic invertebrates and detritus; as noted, Bti and methoprene have little effect on those forage organisms. Endangered goby species have been evaluated in USEPA pesticide risk assessments for larvicides through fish toxicity testing and conservative exposure modeling, and negative effects determinations have concluded that label-compliant larvicide applications are not expected to result in adverse effects to listed fish species (EPA 2026). Mosquito fish are prohibited from release into natural areas under SCP-03.

Belding's Savannah Sparrow

BSS is known to occur (nesting and foraging) within pickleweed and tidal basins within the Goleta Slough in Basins A-H and K, as well as in the Carpinteria Salt Marsh and Devereux Slough.

No vegetation removal or noise generating activities are proposed under typical surveillance and treatments. Technical routine surveillance and treatment activities are consistent with ambient noise in the area. Technicians on foot may cause brief, minor disturbance (e.g., flushing BSS approaching a sampling site), but outside the breeding season these effects are temporary and BSS quickly resume normal behavior after technicians leave. There is no lasting alteration of habitat from surveillance. Even in sensitive areas, surveillance is done by hand with small equipment, ensuring that, for example, marsh substrate is not damaged and no plants are removed.

District activities on foot in the coastal salt marsh mid-March through mid-August have potential to impact BSS nests or fledglings. The BSS nests are cryptic in low-lying pickleweed and the young cannot escape impacts. The treatments and surveillance are conducted concurrently approximately once per month. Surveillance and treatments in March occur at the end of the season for winter mosquitoes. Activities after April transition to targeting mosquito species that are most active in the summer with specific dates based on monthly tidal patterns. Therefore, it is infeasible to schedule surveillance and treatment activities outside of the BSS nesting and breeding season (March 15 through July 15). Potential direct and indirect impacts to BSS would be less than significant with the implementation of District Proposed Measures, specifically SCP-11.

Belding's Savannah Sparrow Avoidance Considered

To completely eliminate disturbance to nesting BSS during their reproductive season, an option considered was to prohibit activities during the period from mid-March through mid-July in coastal salt marsh habitat (Goleta Slough, Devereux Slough, Carpinteria Salt Marsh, and similar habitats).

- Black salt marsh mosquito: Without larvicide use during March to July, these populations would develop unchecked and could create a severe nuisance for UCSB students, airport workers, and Goleta residents. It can also vector diseases such as Eastern Equine Encephalitis (though rare in California, the species is a competent vector).
- Western encephalitis mosquito: Suspending surveillance from March to mid-July would mean no disease testing of mosquitoes during the prime virus transmission season, and no larvicidal suppression of vector populations before they reach peak abundance.
- Southern house mosquito: The seasonal restriction would cover the critical early buildup (March to June), allowing populations to explode before any control resumes in mid-July.

By prohibiting all larval treatments from mid-March to mid-July, the District would restrict the ability to prevent the spring "first generation" of mosquitoes. Mosquito populations grow exponentially: a single untreated pool can produce thousands of adults in 7 to 10 days, which then lay eggs for the next generation. Missing 5 months of control (March 15 to July 15) effectively means missing 5 to 10

generations of mosquitoes (depending on temperature and species). For example, at 25° Celsius (77° Fahrenheit), *Culex* species can complete a generation in ~2 weeks; over 5 months, that allows roughly 10 generations, each multiplying the population. Conservative estimates suggest summer mosquito abundance could increase 10- to 100-fold compared to a scenario with spring larvicide use.

This option is infeasible for several reasons:

- The District is legally obligated to abate mosquito breeding. Choosing not to do so for five months would expose the District to lawsuits, regulatory enforcement, and potential loss of state funding (the CDPH provides grants to vector control districts conditioned on active mosquito management).
- Once mosquito populations explode, regaining control is extremely difficult. The District lacks the resources (staff, equipment, and budget) to mount the scale of emergency response that would be needed post-July 15.
- **Public Health Infeasibility:** This alternative would result in significant public health consequences while providing only marginal additional environmental benefits compared to the proposed SCP-11 measure. The seasonal restriction would:
  - Eliminate mosquito control during the peak breeding season, allowing unchecked population explosions of disease-vector species.
  - Increase summer mosquito populations by an estimated 10–100 fold compared to baseline control, based on the exponential reproductive capacity of coastal mosquito species.
  - Elevate WNV transmission risk to humans and wildlife, as surveillance would be suspended during critical spring virus amplification periods.
  - Violate the District's statutory mandate to abate mosquito breeding as a public health nuisance under H&S Code Section 2000–2093.

State and local health authorities would not approve a plan that leaves the public unprotected from disease vectors for half the year. The County of Santa Barbara Public Health Department works closely with the District and would object, possibly seeking intervention from the CDPH.

The seasonal restriction alternative (no mosquito surveillance or treatment from mid-March to mid-July) is incompatible with responsible public health protection and statutory obligations. The spring and summer treatment would provide minimal incremental environmental benefit, since the IMVMP already implements real-time avoidance of nesting birds through qualified biologist oversight, to be memorialized though SCP-11 measure, which avoids nesting BSS through real-time biological oversight.

Other Special-Status Birds and Nesting Birds

The Goleta Slough has historically supported extensive avian use and includes habitat types recognized as sensitive to disturbance. The Study Area contains habitat capable of supporting nesting birds, including raptors protected under the CFGC and the federal MBTA. The loss of a nest through mortality or abandonment of nests due to treatment activities would be a violation of the MBTA and CFGC Section 3503.

Modern IMM emphasizes surveillance and evaluation to determine when control actions are necessary and can reduce unnecessary treatments and entry. Nonetheless, repeated access or operations conducted during breeding season could indirectly disrupt nesting behavior if not properly managed. Treatments on foot could potentially directly affect ground nesting species, such as killdeer, by crushing nests. Potential activity impacts would be less than significant with implementation of SCP-04 Worker Education Program, SCP-05 ESHA Avoidance, SCP-06 treatment prescreening, and SCP-19 requiring nesting bird season avoidance to ensure compliance with the MBTA and CFGC Section 3503.

The Goleta Slough historically supported diverse bird communities, including many insectivorous species. Birds cannot be harmed by ingestion of treated water or consuming insect prey exposed to Bti/Bs application because the toxins are activated only within specific mosquito larval gut receptor and birds lack these receptors entirely.

Bird diet is rarely dominated by mosquito larvae, especially among adult songbirds and marsh birds. Most gleaning and aerial-hawking birds rely on midges, flies, beetles, lepidopterans, and aquatic insects other than mosquitoes. Since Bti/Bs do not significantly affect these other taxa, prey availability remains intact. Bti/Bs use in modern Integrated Mosquito Management (IMM) programs does not significantly affect food availability for insectivorous birds, and therefore does not create risk of reduced breeding success or energetic stress.

Special-Status Bats

Like birds, bats lack the physiological receptors required for Bti/Bs toxicity. Because CDPH classifies these larvicides as "least-toxic biorational materials" intended to maximize safety for the environment, including mammals, no direct exposure pathway results in toxicity. Since Bti/Bs target only mosquito larvae, not adult flying insects, they do not reduce the adult insect community that bats rely on. Even if localized mosquito abundance decreases, bats feeding on mixed insect swarms experience no meaningful reduction in available biomass, as mosquitoes typically represent a small fraction of the aerial insect assemblage in coastal wetlands. Use of Bti/Bs poses no significant risk to bat foraging resources or population health.

Potential impacts associated with mosquito surveillance and larval control include temporary disturbance from foot access and localized exposure of non-target organisms to larvicides. The IMVMP does not include ground disturbance, vegetation removal, or hydrological modification.

With implementation of District BMPs and SCPs, impacts to special-status plants, wildlife species, sensitive natural communities, ESHA, and aquatic resources would be less than significant.

1.6.2 ESHA and Sensitive Natural Communities

ESHA generally includes all treatment areas in the coastal zone. Treatment areas shown in the GSEMP ESHA can be broadly interpreted to include native vegetations in the GSEMP.

Surveillance and Treatment Application

Surveillance, foot access, and larvicide application could result in temporary and localized disturbance to sensitive vegetation or soils if personnel enter marsh margins or traverse sensitive habitat areas. Overall, surveillance activities cause negligible physical disturbance to habitats. There is no lasting alteration of habitat from surveillance. Even in sensitive areas, surveillance is done by hand or with small handheld equipment, ensuring that, for example, marsh substrate is not damaged and no plants are removed.

Activities involve surveillance and larvicide only and do not include grading, fill, dredging, or habitat modification. Habitat alterations to drain such areas are not conducted by the District, but the District may provide technical assistance to landowners to develop effective water management systems in accordance with applicable environmental laws and mosquito reduction BMPs. Modern IMM approaches emphasize surveillance to minimize unnecessary entry and treatment and encourage non-chemical BMPs where feasible to reduce mosquito production. Because interior access would occur on foot and vehicles would remain on the existing roads, disturbance potential would be limited in area and duration. The Goleta Slough's recognized sensitivity to disturbance supports maintaining strict access controls and limiting intrusion.

Coastal salt march impacts would be further reduced under SCP-06 and -11 which would limit access routes through undisturbed areas during the BSS breeding season.

Treatment Chemicals

As discussed above, impacts to habitat from treatments would be less than significant with adherence to label requirements and state and federal laws governing pesticide use.

The use of adulticides has not been required in direct association with mosquito production in vernal pools, and this is not anticipated to be an issue in the foreseeable future. If adulticide use were to become necessary within proximity (relative to swath widths of ultra-low volume (ULV) application equipment) to vernal pools, applications would be performed in strict accordance with the product label, using the appropriate measures and practices listed in Section 2.2 and in consultation with property owners.

Adulticide use, if triggered as a contingency response, could increase risk of non-target effects (e.g., effects on non-target insects) and could increase potential for disturbance within sensitive habitats. Adulticides can affect non-target insects and are typically more broadly dispersive and have a wider range of insecticidal effects than larvicides. Adult mosquito control is considered a response tool implemented when surveillance indicates elevated public health risks and other control measures are insufficient. If adulticide were applied, it would be implemented under strict operational controls and only when warranted.

Because larvicides are applied to water, direct impacts to terrestrial habitats and wildlife are extremely limited. The only conceivable route is overspray drift or movement of treated water into upland areas. In practice, drift is minimized by using granular or briquette formulations applying when winds are calm. For example, methoprene is often applied as small granules using a horn seeder or backpack blower or as small briquettes by hand; this method places the material precisely into marsh pools, avoiding upland plants. Under a public health emergency adulticide liquid sprays (if ever used) are applied with ULV equipment calibrated to produce fine droplets that settle quickly and do not dispersal far. The chance of significant pesticide deposition on surrounding upland vegetation is extremely small and impacts from adulticide would be less than significant.

1.6.3 Hydrology

Larval control treatments could affect non-target aquatic organisms if misapplied or overapplied, potentially altering local food-web components relied upon by fish and birds. Bti/Bs do not persist in water and would not violate a water quality standard.

Modern IMM emphasizes elimination and reduction of water sources and hydrologic improvements to reduce stagnation, improve flow, and manage vegetation, to reduce mosquito breeding and chemical intervention. However, source reduction and hydrologic improvements, such as vegetation removal or drainage, introduction of fish, or herbicide application may have significant impact on these habitats and is not proposed as part this Plan.

The Plan as proposed would have no direct impact on hydrology since direct removal, filling, or hydrological interruption is not considered. The implementation of all the plan components would not result in any significant impacts on aquatic or wetland resources. All impacts are either less than significant or none. Therefore, no mitigation is required. The pesticide applications are constantly under surveillance and are monitored for total pesticide use, amount used per acre, timing of applications, and parameters affecting application scenarios. Under the National Pollutant Discharge Elimination System Permit annual reports are provided for chemical use in aquatic systems to the SWRCB,

Larvicides used under the IMVMP are non-persistent, do not bioaccumulate, and are authorized under the statewide National Pollutant Discharge Elimination System Vector Control Permit. No changes to hydrology, water circulation, or wetland function are proposed.

1.6.4 Wildlife Movement

No mapped wildlife movement corridors are present within the Study Area. However, the Study Area is within the Goleta Slough, which wildlife may travel through. Surrounding vegetated areas provide suitable small-scale wildlife movement corridors for wildlife to travel locally and are important in linking non-contiguous or fragmented wildlife habitats. Wildlife movement corridors could be indirectly impacted during District activities through the introduction of noise and increased human presence.

Increased human activity could affect essential behavioral activities and physiology of wildlife. The Study Area itself is primarily surrounded by urban development, including Highway 101 and SR 217, UCSB campus, and residential and commercial development, which make it less ideal as a wildlife movement route. Furthermore, the Study Area is within an active airport. The noise impacts from the District would be limited to occasional light-vehicle travel on existing roads; and no heavy machinery use is proposed. Access is limited to up to six technicians and a biological monitor during daylight hours which would not substantially increase human presence. Surveillance improves efficiency and reduces unnecessary treatments. Any disruption of migration patterns would be due to the presence of personnel on foot.

District activities do not involve habitat modification, pollutant discharge, or wildlife harassment. They are carefully conducted to respect the sensitive setting and timing in this coastal salt marsh and nesting bird habitat. Surveillance is the foundation of an IMM approach; it allows the District to target problem areas and times, thereby reducing unnecessary interventions and ensuring that any larval treatments are truly needed.

District activities will not introduce new barriers to movement of resident or migratory wildlife species (i.e., fish or birds), as the District's activities are focused on treating basins for mosquito and vector control. No permanent or temporary fences, barriers or other impediments to wildlife movement would be constructed. In all cases, this occurrence would be very short term, generally not more than a few hours in any given location. Therefore, this effect would be minimal, would have no substantial adverse effect on the movement of native resident or migratory fish or wildlife, and would not affect wildlife migration corridors or nursery areas, as no physical disturbance would occur.

Food Web

The proposed IMVMP would target identified vector threats and use various methods to protect the public from vector-borne disease and nuisances and is not intended to interfere with the movement of any native resident or migratory fish or wildlife species. The majority of IMVMP activities would focus on the surveillance and monitoring of potential vector breeding sources and populations through noninvasive methods (i.e., aerial surveys [not currently conducted], mosquito trapping, etc.), and control of vector populations through application of larvicides and, only in emergencies, by adulticides. Surveillance and monitoring activities would not result in the removal or alteration of native habitats. Surveillance and source treatment activities may temporarily occur near local wildlife movement areas due the presence of personnel and equipment, but any potential disruptive effects would be minimal and last no longer than a few hours in any given location. Wildlife would be expected to move back into the area once activities have ceased and no major habitat or ground disturbance has occurred. Therefore, these activities would not impede the movement of native, resident, or migratory fish or wildlife species nor interfere with established native, resident, or migratory wildlife corridors, and would not impede the use of native wildlife nursery sites.

Use of Bti/Bs under the Plan is expected to result in less-than-significant impacts to aquatic food webs, insectivorous birds, and bats. These larvicides are targeted, biorational products that affect only mosquito larvae and do not harm vertebrates or most aquatic invertebrates. Therefore, while mosquito larvae may decrease locally following treatment, the overall insect community remains intact, and food availability for insect-feeding birds and bats is not significantly altered.

No barriers to wildlife movement would be created. Activities are short-duration, localized, and conducted using non-intrusive methods. Wildlife corridors and nursery sites would remain functional.

1.6.5 Resources Protected by the Coastal Act, Local Policies, and Ordinances

The County and City of Santa Barbara general plans, LCPs, and community plan and their goals and policies pertaining to natural resources are protective of aquatic resources and focused on conservation of existing resources including riparian, wetland, marsh, and slough communities. District activities would

not result in the conversion of natural habitats to other land uses in the long term or permanent dislocation of plant and animal species from natural areas, except indirectly for mosquitoes and vectors of disease and discomfort. Surveillance activities would not affect trees, and therefore, would not conflict with any tree ordinances.

The CCA defines alteration of coastal wetlands as "development," often needing a CDP. However, the District's routine mosquito control (surveillance and larvicide use) is an ongoing maintenance activity that does not significantly disrupt habitat. The District has cooperated with the CCC to ensure its practices are consistent with Coastal Act policies. For example, after concerns about the District's amphibious all-terrain vehicle's (Argo) impact on marsh ESHA, the CCC and District reached consensus to discontinue its use in such habitats.

City of Santa Barbara Airport Local Coastal Program

1982 and 2003 LCP policies pertaining to vector management:

> *Mosquito Abatement Policy C-2: The City shall cooperate with Goleta Valley Mosquito Abatement District to see that mosquito abatement practices be limited to the minimum necessary to protect health and prevent damage to natural resources. Spraying shall be avoided during nesting seasons to protect wildlife, especially the endangered light-footed clapper rail and Belding's savannah sparrow. Biological controls are encouraged.*
>
> *Policy C-7: Any on-going activities of special districts such as Flood Control or Mosquito Abatement, etc., which constitutes development as defined in the Coastal Act shall be reviewed for approval by the City and must receive a Coastal Development Permit (or its equivalent) prior to commencement of activities.*
>
> *Actions:*
>
> *In order to determine consistency with Policy C-9, investigate and define the nature and timing of permitted on-going activities conducted in the slough by the Mosquito Abatement District and the Flood Control District.*
>
> *Encourage the Goleta Valley Mosquito Abatement District's use of biological methods for mosquito control.*
>
> *Policy C-10: All development and mitigation of impacts on Goleta Slough shall be consistent with the policies of the Goleta Slough Ecosystem Management Plan, which is adopted and incorporated herein as Appendix G as it pertains to the Airport property.*

Consistent. Surveillance and larval treatment do not constitute development that would require a CDP and are specifically exempted under the City of Santa Barbara Airport Zoning Ordinance (§ 29-25.030). If future emergency treatment provisions require "development" a Goleta Slough CDP would be obtained. Biochemical controls are used for larvicide. Under the IMM principles implemented by the District, the practices and chemicals used is the minimum necessary to protect public health at and abate nuisances.

2015 Goleta Slough Area Sea Level Rise and Management Plan

The Goals, Policies and Actions of the 2015 Goleta Slough Area Sea Level Rise and Management Plan pertaining to Vector Control include:

> *Action A-2.6 - Coordinate with the Goleta Valley Vector Control District in the management of mosquitoes and other species under their jurisdiction that occur in the Slough area. Pursue alternatives to District vehicle access in the Slough to minimize disruption of wetland habitat.*

Consistent. BMP-05 requires interagency communication and SCP-08 stakeholder communication includes participation in the GSMC. Vehicle access is confined to existing roadways to minimize disruption of wetland habitat as reflected under SCP-01.

UCSB LRDP

> *Policy ESH-10 – The University shall use mosquito control methods with the least effect upon non-target organisms and shall use environmentally sensitive pesticides (such as VectoBac®). Wetlands shall not be drained for this purpose, nor shall native wetland vegetation be removed, nor shall non-native larval predators be introduced.*

Consistent. As discussed above IMM require the use of mosquito abatement techniques that have the least effect upon non-target organisms and shall use environmentally-sensitive pesticides, including VectoBac. Additionally, District chemical use must be consistent with those approved under the UCSB Integrated Pest Management Plan (UCSB 2010) under BMP-04. Mosquito fish are prohibited from being introduced into natural areas under SCP-03. The District does not drain wetlands or remove native vegetation.

The UCSB LRDP emphasizes hazard management and ecological stewardship in campus-adjacent areas. Mosquito abatement supports these goals by preventing disease outbreaks (public safety) while adhering to environmental constraints. UCSB has historically collaborated with the District and regulators to allow larval treatments in campus and adjacent wetlands.

City of Goleta

> *CE 1.10: Management of ESHAs. The following standards shall apply to the ongoing management of ESHAs:*
>
> *a. The use of insecticides, herbicides, artificial fertilizers, or other toxic chemical substances that have the potential to degrade ESHAs shall be prohibited within and adjacent to such areas, except where necessary to protect or enhance the ESHA itself.*
>
> […]
>
> *c. Mosquito abatement within or adjacent to ESHAs shall be limited to the implementation of the minimum measures necessary to protect human health Tecolote Creek Lagoon and shall be undertaken in a manner that minimizes adverse impacts to the ESHAs*
>
> *Policy C-7: Ongoing activities of special districts require City approval and Coastal Development Permit. Action: Encourage Goleta Valley* [Vector Control]*'s use of biological methods of mosquito control.*

Consistent. The larvicides used for treatments are not considered a toxic chemical substance that have the potential to degrade ESHA. As discussed above under IMM principles, the District's activities are the minimum required. The use of bacterial-based larvicides is considered a biological method of mosquito control.

1.7 GSEMP Cumulative Impacts

The ongoing mosquito surveillance and larval treatment activities in Goleta Slough present *no significant adverse cumulative impacts* on the environment. In fact, these targeted, small-scale interventions mitigate public health risks without undermining broader ecological and planning goals. Under the California Environmental Quality Act (CEQA), the incremental effects of these vector control actions are *not* "cumulatively considerable" meaning they do not add appreciably to any environmental degradation when considered alongside other projects. District activities align with the local resource management policies by ensuring that public health protection (through mosquito abatement) is achieved in harmony with habitat conservation and regulatory compliance.

Santa Barbara County Flood Control District Beach SMART

Beach SMART (Beach Sediment Management and Resilience Tactics) is being led by the SBCFCD and takes a comprehensive approach to analyzing the movement of sediment on the south coast of Santa Barbara County and developing a watershed-wide management process for more tailored and appropriate strategies for beach enhancement (i.e., sediment deposition on beaches). Beach SMART is a collaboration to inform and improve the way sediment is managed in Santa Barbara County. By focusing on natural watershed processes and exploring nature-based solutions, the project aims to build long-term resiliency for our beaches, creeks, and coastal communities. Goleta Slough mouth management may be included under the Regional Sediment Management Plan and environmental analysis.

The mouth of Goleta Slough naturally closes with beach sand periodically, increasing water levels in the Goleta Slough, which in turn increase flood risks, attract a larger population of waterfowl, and supports larger populations of mosquitoes. SBCFCD historically maintained the mouth of Goleta Slough as part of its routine maintenance operations since at least 1994. Periodic breaching of the Goleta Slough mouth was incorporated in the management program as described and evaluated under the 2010 a Final Supplemental Environmental Impact Report certified in 2010 (Padre 2010). Under this management strategy the mouth was opened any time sand buildup caused a closure lasting more than two weeks. This practice was discontinued when permits expired in 2012, and NMFS indicated that continued breaching would require further study (Coffman Associates 2013). This maintenance has not occurred from 2012 onward, and is not covered in the existing permits. Prolonged mouth closure results in increased water depth, changed water quality, altered habitat conditions, increased potential for wildlife airport hazards, increased mosquito breeding habitat, flood risks, shifts in habitat from marsh to open water, stagnation, and water quality problems.

Goleta Slough mouth management under SMART would have beneficial effect activities since it would reduce standing freshwater and encourage tidal circulation and reduce the scope of the District's activities in the coastal salt marsh, particularly in the spring and summer.

Santa Barabra Airport Local Coastal Program Update and Emergency Flood Permitting

SBA is developing a Climate Adaptation Plan (CAP), focusing on potential adaptation measures to address flooding issues along with ongoing and planned adaptation measures, such as sediment management and storm drain improvements. Comprehensive analysis of flood management options for the SBA include near-term, mid-term, and long-term groundwater management, storm drainage improvements, and airfield modifications. The ESHA team recommended a feasibility and effectiveness study along with development of conceptual plans for three selected adaptation measures that would include preliminary cost estimates. The three intermediate measures for consideration are: a permanent berm along Carneros Creek, wetland floodplain restoration north of Carneros Creek, and a stormwater detention facility north of Runway 15R. The next steps include completing the CAP report, preparing for public workshops, and considering a feasibility study.

Following the storms and flooding in winter 2025, SBA submitted and emergency permit for flood control measures.

The SBA implementation of flood control and sea level rise adaption may reduce MVMD's need to treat the area since it may reduce standing freshwater and encourage tidal circulation and reduce the scope of the District's activities in the coastal salt marsh, particularly in the spring and summer.

UCSB Western Goleta Slough Tidal Restoration Project.

The UCSB CCBER manages more than 340 acres of open space between Ellwood Mesa and Goleta Slough. CCBER received a grant from the Wildlife Conservation Board to study and permit reconnecting up to 18 acres of estuarine wetlands and development of a restoration plan for 62 acres of upland, emergent wetland, and tidal wetland habitats located on UCSB property and CDFW's Goleta Slough Ecological Reserve. The CCBER is currently working on assessing the ecological function of tidal and non-

tidal portions of the project site and adjacent Goleta Slough for birds, aquatic invertebrates, plant diversity, and vigor.

The long-term cumulative impact would be beneficial since reducing standing freshwater and encouraging tidal circulation would reduce the scope of the District's treatment in the coastal salt marsh. However, in the short term, alteration of hydrology could temporarily increase the amount of shallow standing water in the basin due to manipulation of the water control structures draining these areas in wet years and flooding could persist for several days. Past tidal restoration projects have required CDFW to contract with the local vector control district to monitor and treat the basins in these situations (URS 2005, Mitigation Measure PS-1).

Development Projects

Based on cursory review of local development projects, none have the potential for cumulative impacts except for creation of on-site swales and detention basins (required under state law) which could create new treatment areas. While this impact is not significant, since these areas are worked into the existing program, BMP-05 encourages coordination with the environmental review process for local discretionary applications.

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1.10 Common and Scientific Names of Species Referenced

Table 5 Common and Scientific Names of Species Referenced

Common Name	Scientific Name
Plants	
red sand verbena	*Abronia maritima*
Parish's glasswort	*Arthrocnemum subterminale*
coyote brush	*Baccharis pilularis*
ice plant	*Carpobrotus edulis*
southern tarplant	*Centromadia parryi ssp. australis*
water pygmy weed	*Crassula aquatica*
shore grass	*Distichlis littoralis*
saltgrass	*Distichlis spicata*
short-seeded waterwort	*Elatine brachysperma*
needle spikerush	*Eleocharis macrostachya*
alkali heath	*Frankenia salina*
meadow barley	*Hordeum brachyantherum*
Leopold's rush	*Juncus acutus ssp. leopoldii*
Coulter's goldfields	*Lasthenia glabrata* ssp. *coulteri*
beardless wildrye	*Leymus triticoides*
Santa Barbara honeysuckle	*Lonicera subspicata var. subspicata*
Lemmon's phalaris	*Phalaris lemmonii*
pickleweed	*Salicornia pacifica*
arroyo willow	*Salix lasiolepis*
tule	*Schoenoplectus acutus var. occidentalis*
bur-reed	*Sparganium eurycarpum*
estuary seablite	*Suaeda esteroa*
woolly seablite	*Suaeda taxifolia*
southern annual saltmarsh aster	*Symphyotrichum subulatum var. ligulatum*
horned pondweed	*Zannichellia palustris*
Invertabrates	
Crotch's bumble bee	*Bombus crotchii*
California horn snail	*Cerithidea californica*
senile tiger beetle	*Cicindela senilis frosti*
monarch butterfly, California overwintering population	*Danaus plexippus plexippus* pop. 1
mud crab	*Hemigrapsus oregonensis*
bent-nose clam	*Macoma nasuta*
California beach flea	*Megalorchestia californiana*
salt marsh snail	*Melampus olivaceus*
lined shore crab	*Pachygrapsus crassipes*

Common Name	Scientific Name
common littleneck clam	*Protothaca staminea*
California jackknife clam	*Tagelus californianus*
Pacific beach hopper	*Traskorchestia traskiana*
Fish	
topsmelt	*Atherinops affinis*
arrow goby	*Clevelandia ios*
Pacific herring	*Clupea pallasii*
prickly sculpin	*Cottus asper*
tidewater goby	*Eucyclogobius newberryi*
California killifish	*Fundulus parvipinnis*
partially armored threespine stickleback	*Gasterosteus aculeatus*
longjaw mudsucker	*Gillichthys mirabilis*
cheekspot goby	*Ilypnus gilberti*
Pacific staghorn sculpin	*Leptocottus armatus*
southern California steelhead	*Oncorhynchus mykiss irideus pop. 10*
California halibut	*Paralichthys californicus*
shadow goby	*Quietula y-cauda*
Birds	
green-winged teal	*Anas crecca*
mallard	*Anas platyrhynchos*
great egret	*Ardea alba*
great blue heron	*Ardea herodias*
Cooper’s hawk	*Astur cooperii*
great horned owl	*Bubo virginianus*
dunlin	*Calidris alpina*
Baird’s sandpiper	*Calidris bairdii*
western sandpiper	*Calidris mauri*
least sandpiper	*Calidris minutilla*
California quail	*Callipepla californica*
Wilson’s warbler	*Cardellina pusilla*
house finch	*Carpodacus mexicanus*
western snowy plover	*Charadrius nivosus nivosus*
killdeer	*Charadrius vociferus*
snowy egret	*Egretta thula*
Caspian tern	*Hydroprogne caspia*
yellow-breasted chat	*Icteria virens*
short-billed dowitcher	*Limnodromus griseus*
long-billed dowitcher	*Limnodromus scolopaceus*
double-crested cormorant	*Nannopterum auritum*

Common Name	Scientific Name
long-billed curlew	*Numenius americanus*
black-crowned night heron	*Nycticorax nycticorax*
Belding's Savannah sparrow	*Passerculus sandwichensis beldingi*
brown pelican	*Pelecanus occidentalis*
Nuttall's woodpecker	*Picoides nuttallii*
ruby-crowned kinglet	*Regulus calendula*
yellow warbler	*Setophaga petechia*
California least tern	*Sternula antillarum browni*
European starling	*Sturnus vulgaris*
violet-green swallow	*Tachycineta thalassina*
greater yellowlegs	*Tringa melanoleuca*
American robin	*Turdus migratorius*
warbling vireo	*Vireo gilvus*
mourning dove	*Zenaida macroura*
pectoral sandpiper	*Calidris melanotos*
white-tailed kite	*Elanus leucurus*
Mammals	
pallid bat	*Antrozous pallidus*
coyote	*Canis latrans*
Virginia opossum	*Didelphis virginiana*
western mastiff bat	*Eumops perotis californicus*
hoary bat	*Lasiurus cinereus*
western red bat	*Lasiurus frantzii*
yuma myotis	*Myotis yumanensis*
common raccoon	*Procyon lotor*

Attachment C.1

Goleta Slough Ecosystem Biological Technical Appendix Photographs

Photograph 1. View of Santa Barbara County Mosquito Vector Management District (District) field technicians using existing, maintained road to access Triangle basin (Area M and L) at the Goleta Slough via 4x4 trucks, facing east. Road consists primarily of clover species and annual grasses (December 9, 2025).

Photograph 2. View of Fourstar Briquettes deployed for pre-treatment. Briquettes are carried in buckets by District field technicians (December 9, 2025).

Photograph 3. View of tidal basins and pickleweed mats at Goleta Slough, facing north. District field technicians enter water to begin pre-treatment at Triangle basin in the Goleta Slough. Fourstar briquettes are carried in buckets. Treatment is deployed by foot, and foot traffic through pickleweed is the minimum necessary to conduct the pre-treatments (December 9, 2025).

Photograph 4. View of pickleweed mats at Goleta Slough, facing northwest. District field technicians deploy fourstar briquettes by hand at Triangle basin in the Goleta Slough. Treatment is deployed by foot, and foot traffic through pickleweed is the minimum necessary to conduct the pre-treatments (December 9, 2025).

Photograph 5. View of existing, maintained road to access Tule pond (Area J) and White Pole (Area I) at the Goleta Slough, facing north. Road consists of bare ground surrounded by native vegetation, such as arroyo willow (*Salix lasiolepis*) and coyote bush (*Baccharis pilularis*) (December 10, 2025).

Photograph 6. View of tule (*Schoenoplectus acutus* var. *occidentalis).* District field technicians use the polyvinyl chloride (PVC) pipe method to deploy multiple Fourstar briquettes at Tule pond, facing northeast (December 10, 2025). District staff deploy briquettes on foot from the maintained access road due to restricted access in dense tule.

Photograph 7. View of tidal basins and pickleweed mats at Goleta Slough, facing west. A District field technician conducts surveillance activities at the Duck Pond (Area K) (December 10, 2025).

Photograph 8. View of a sampling cup with a single mosquito larvae. District staff use sampling cups to check for the presence of mosquito larvae prior to treatment. Any bycatch is released back into the basin (December 10, 2025).

Photograph 9. View of VectoBac G (granule) deployed for treatment. Granules are carried by District field technicians in horn seeder equipment (see next photograph; December 10, 2025).

Photograph 10. View of horn seeder equipment carried by District field technicians to deploy granules. The horn seeder includes a heavy duty vinyl bag that holds granules, and a PVC pipe that disperses them. (December 10, 2025).

Photograph 11. View of tule and tidal areas at the Hollister Sources (Area S), facing east. District access is along Hollister Avenue (a portion is visible on the left) (December 12, 2025).

Photograph 12. View of Santa Barbara Airport facing northwest. District access along paved roads within Santa Barbara Airport, with Santa Barbara Airport escort (January 13, 2026).

Photograph 13. Northeast view from GWSD of freshwater Duck Pond (Area/Basin K) treatment area and pickleweed mats following above average precipitation in December 2025. Ice plant (*Carpobrotus edulis*) is present directly behind GWSD (January 14, 2026).

Photograph 14. View of oil film at surface of water at the Duck pond observed prior to treatment activities, facing east. Oil film is likely natural or runoff from a January 2026 rain event, and is not District-activity related (January 14, 2026).

Photograph 15. View of a yellow fever mosquito (*Aedes aegypti*) and battery powered Biogents Sentinel trap used in urban areas that has been developed specifically for detection of the yellow fever mosquito and the Asian tiger mosquito (*Aedes albopictus)*. (Source: MVDSBC 2026)

Photograph 16. View of a CO_2 trap, which lures many species of mosquitoes with dry ice, which mimics the smell of an exhaling animal. These traps are set overnight at the margins of vegetation transitions. (Source: MVDSBC 2026)

Attachment C.2

Natural Resources Regulatory Setting

(Public review note: Appendix C, Attachment A.2 will be included in the Final Plan)

Appendix D

Walking In the Marsh: Methods to Increase Safety and Reduce Impacts to Wildlife/Plants (USFWS)

Walking In the Marsh:
Methods to Increase Safety and Reduce Impacts to Wildlife/Plants

I. Safety

A. *Before heading out into the marsh check the tides*: tides can affect your ability to move through the marsh. Be aware of how long you plan to be in the marsh, what channels you may have to cross, and how the tides will change while you are in the field.

B. *Plan your route through the marsh*: use existing aerial imagery and maps to identify channels and sloughs that may impede access. When available, use high points such as boardwalks or levees to scope out a route. Scoping a route can be especially important in scenarios where visibility across the marsh is low (e.g., South Bay, Suisun). It may be necessary to flag stations and/or access corridors through the marsh prior to surveys. If more than one person is accessing the marsh, travel together along major access routes to avoid the development of multiple paths. At the end of the sampling period, persons furthest out should walk out first, meeting up with others along the major access route…this minimizes the potential of people getting lost and ensures that anyone who is injured will be found in a timely manner (before everyone else has left the marsh). The goal should be to plan a safe route into and out of the marsh while minimizing travel and pathways.

C. *Channels and sloughs*: Avoid jumping channels in locations where you cannot see through vegetation on the opposite bank. Thick vegetation (e.g., pickleweed, gumplant) can obscure the edge of the bank. Considerations before jumping: depth of water/channel, steepness of the channel edges, tide levels. If you are not confident that you can make the jump and the edges have high dense vegetation that you cannot see through…..DO NOT JUMP.

D. *Getting stuck in the mud*: If you are sinking into mud, try to keep moving to avoid getting stuck further. If a leg gets stuck, try to twist your leg to break the suction while leaning your weight on your other leg or knee. Use whatever material you have available (e.g., clipboard, backpack) for leverage (e.g., lean on those items).

E. *Other*: Besides general items such as water and food, it's a good idea to bring a flashlight and a phone (+GPS) in cases of an emergency. Let someone know what marsh area you will be in and when you plan to complete work for the day. Designate an end time and final meeting place when more than one person is out in the marsh at the same time.

II. Avoiding Impacts to Wildlife and Plants

A. *Movement through the Marsh.* While walking through the marsh, keep noise to a minimum. Avoid using multiple pathways through the marsh. Use trails if they exist. Plan and map your route to minimize environmental impacts and decrease running into hazards/barriers such as large channels. When looking for a suitable place to jump a channel, do not walk along the edge of the channel/slough because these areas provide nesting habitat for many species including the endangered CA clapper rail. To find an alternate jump site, walk parallel to the channel at a distance where vegetation is lower in height and where visibility of the ground surface is greater. At all times, observe the environment you are walking through to avoid disturbance. Choose channel jump sites where vegetation is lower or you can clearly discern what you are jumping onto. In general, avoid walking adjacent and parallel to channels/sloughs.

B. *Avoiding nests and nest substrates.* Tidal marsh species have nests that are well concealed and therefore easy to disturb when walking through the marsh. To avoid stepping on a nest, do not walk through thick vegetation or areas where you cannot see through to the ground. Avoid walking on vegetation whenever possible since plants serve as nesting substrate for many species in the marsh. In general, be aware of the area you are walking through. See Tables 1 for nest characteristics of common tidal marsh birds.

C. *Bird Behavior.* If a bird vocalizes or flushes within close range of where you are standing or walking (e.g., < 10-m), it is possible that a nest or young are nearby. When these circumstances arise, stop whatever you are doing and leave the immediate area (be sure to watch where and what you are walking on). Choose an alternate route through the marsh, identify the new route and location of the sighting/occurrence on a map, and record coordinates of the location if possible. Be sure to pass this information on to others that may use the same route or are conducting surveys in the same area. Be very observant of where you walk as you leave the area. There exists the possibility that you could step on a nest or young, both of which can be

concealed by vegetation or cryptic. When alarmed, individuals may freeze in place (especially juveniles).

D. *Tidal lagoons/ponds.* Avoid walking along tidal lagoons and ponds in marsh interiors that support foraging, roosting, or nesting shorebirds and waterfowl. Be observant of the distance at which birds flush or become alarmed.

E. *Tides.* Avoid conducting surveys during high tides as much as possible. These are periods when many wildlife species are at greatest risk (e.g., predation). If your surveys require a high tide, be aware of the increased risk you may cause for wildlife and take all precautions to reduce that risk (e.g., avoiding areas where sensitive species are known to occur).