United States Department of the Interior
FISH AND WILDLIFE SERVICE
Sacramento Fish and Wildlife Office
2800 Cottage Way, Suite W-2605
Sacramento, California 95825-1846
SFWO_mail@fws.gov

In Reply Refer to:
81420-2008-F-0261-R002

June 11, 2020

Regulatory Division Chief
San Francisco District
U. S. Army Corps of Engineers
450 Golden Gate Avenue, 4th Floor, Suite 0134
San Francisco, California 94102-3406
Sahrye.E.Cohen@usace.army.mil
CESPN-Regulatory-Info@usace.army.mil

Subject: Reinitiation of Formal Consultation on Issuance of Clean Water Act, Section 404 Permits by the U.S. Army Corps of Engineers (Corps) on the Santa Rosa Plain, Sonoma County, California

Dear Regulatory Division Chief:

This letter is in response to the U.S. Army Corps of Engineer's (Corps) April 21, 2017, request to reinitiate formal consultation with the U.S. Fish and Wildlife Service (Service) on the Issuance of Clean Water Act, Section 404 Permits on the Santa Rosa Plain, Sonoma County, California. Your request was received by the Service on April 26, 2017. At issue are the adverse effects on the endangered Sonoma County Distinct Population Segment (DPS) of the California tiger salamander (Sonoma County California tiger salamander) (*Ambystoma californiense*) and its critical habitat, Burke's goldfields (*Lasthenia burkei*), Sebastopol meadowfoam (*Limnanthes vinculans*), and Sonoma sunshine (*Blennosperma bakeri*). Critical habitat for the Sonoma County tiger salamander was not designated at the time of issuance of the November 9, 2007 Programmatic Biological Opinion. Critical habitat was designated on August 31, 2011, and you have requested reinitiation of the Programmatic Biological Opinion to analyze the effects of the proposed action on critical habitat for the Sonoma County California tiger salamander. This programmatic biological opinion was prepared under the authority of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 *et seq.*) (Act).

The federal actions on which we are consulting are the issuance of Clean Water Act, Section 404 Permits by the Corps for the fill of waters of the United States associated with projects in the Santa Rosa Plain. The following sources of information were used to develop this programmatic biological opinion: (1) the Designation of Critical Habitat for the Sonoma County California Tiger Salamander (Service 2011); (2) the Santa Rosa Plain Conservation Strategy (Conservation Strategy) (Conservation Strategy Team 2005); (3) the Interim Mitigation Guidelines authored by the Service and California Department of Fish and Wildlife (CDFW), dated May 16, 2006; (4) the *Programmatic Biological Opinion (Programmatic) for U.S. Army Corps of Engineers (Corps) Permitted Projects that May Affect California Tiger Salamander and Three Endangered Plant Species on the Santa Rosa Plain, California (Corps File Number 223420N),* (2007 Programmatic Biological Opinion) dated November 9, 2007 (Service file number 81420-2008-F-0261) (Service 2007); (5) the *Recovery Plan for the Santa Rosa Plain* (Recovery Plan)

(Service 2016); (6) emails, phone conversations between representatives of the Service, the Corps, CDFW, and consulting biologists; and (7) other information available to the Service.

Projects anticipated to adversely affect occurrences of Burke's goldfields, Sebastopol meadowfoam, or Sonoma sunshine recorded in the California Natural Diversity Database (CNDDB) do not qualify for coverage under this programmatic biological opinion and will need to have case specific biological analysis and separate biological opinion issued because appropriate conservation for loss or degradation of the sites is case specific. However, projects anticipated to adversely affect suitable habitat of Burke's goldfields, Sebastopol meadowfoam, or Sonoma sunshine are covered in this programmatic biological opinion.

Consultation History

July 17, 1998:	The Service issued a programmatic biological opinion to the Corps for Clean Water Act, Section 404 permitting actions in the Santa Rosa Plain that addressed the effects of Corps permitting on the Sonoma sunshine, Sebastopol meadowfoam, Burke's goldfields, and the many-flower navarretia (*Navarretia leucocephala ssp. plieantha*) (Service file number 1-1-98-F-0053)(Service 1998).
December 1, 2005:	The federal listing of the Sonoma County California tiger salamander led to the development of a Conservation Strategy (Conservation Strategy Team 2005). The purpose of the Conservation Strategy for listed species in the Santa Rosa Plain was to coordinate development with the conservation needs of the species.
November 9, 2007:	The Service issued a new programmatic biological opinion to incorporate the Conservation Strategy (Conservation Strategy Team 2005) and the Sonoma County California tiger salamander, and removed the many-flower navarretia because of its limited distribution in the Santa Rosa Plain (Service 2007).
April 13, 2009:	The Service amended the 2007 programmatic biological opinion to clarify plant surveys are required if projects are in areas that may affect listed plants.
April 26, 2017:	The Corps requested to reinitiate consultation to include critical habitat for the Sonoma County California tiger.

INTRODUCTION

This programmatic biological opinion replaces the 2007 Programmatic Biological Opinion and is intended to streamline section 7 consultations for projects that implement the conservation measures herein. The Conservation Strategy, 2007 Programmatic Biological Opinion, Recovery Plan, and other information helped guide the conservation framework and conservation measures in this programmatic biological opinion. These documents are discussed in more detail in the *Status of the Species and Environmental Baseline* section.

The Corps and CDFW provided guidance and technical assistance in the preparation of this programmatic biological opinion. The California tiger salamander, Burke's goldfields, Sebastopol meadowfoam, and Sonoma sunshine are also protected under the California Endangered Species Act (CESA), and separate authorization from the CDFW for impacts to these species may be needed. Please visit CDFW's CESA Permits webpage for more information (https://www.wildlife.ca.gov/Conservation/CESA). CDFW habitat impacts and compensation

requirements may differ from this document in order to fully mitigate the impacts under CESA. Integrating CDFW's permit conditions or recommendations can help the Corps and Service append projects to this Programmatic Biological Opinion. Providing CDFW's Incidental Take Permit, application, or other correspondence with CDFW regarding the project will aid in coordination and appending projects. If California tiger salamander or plant surveys are proposed, include CDFW's written approval of the survey methodology.

ADMINISTRATION OF THE PROGRAMMATIC BIOLOGICAL OPINION

This programmatic biological opinion covers Clean Water Act, Section 404 permitting actions by the Corps that may affect the Sonoma County California tiger salamander and/or its critical habitat and Burke's goldfields, Sebastopol meadowfoam, or Sonoma sunshine in the Santa Rosa Plain. The Corps should refer to Figures 1-6 to help make an effect determination.

Initial Rollout

The Corps will partner with the Service to provide an initial rollout of this programmatic biological opinion for staff of both agencies to ensure that the specifics of the programmatic biological opinion are considered at the onset of each project, and incorporated into all phases of permit process review, and that any constraints are resolved early on.

Corps Review

The Corps can request that the Service append a project to this programmatic biological opinion after review of Figures 1-6 and providing the following information:

1. Corps permit application including the Applicant's full name, mailing address, electronic mail address, telephone number, Assessor's Parcel Number(s), Universal Transverse Mercator (UTM) coordinates or latitude and longitude, and street address of the project.

2. Corps-verified jurisdictional determination.

3. Biological Assessment including:

    a. Proposed conservation consistent with the conservation framework in this programmatic biological opinion.

    b. Anticipated effects to the species and critical habitat.

    c. Description, quantity, and effects to the Sonoma County California tiger salamander upland and aquatic habitat and primary constituent elements for critical habitat.

    d. Description, quantity, and effects to Burke's goldfields, Sebastopol meadowfoam, and Sonoma sunshine wetland and pollinator habitats.

4. Survey report(s):

    a. Plant surveys are required if proposed projects are in areas of suitable habitat for listed plants. Plant surveys are not needed if the site does not support suitable habitat.

b. Sonoma County California tiger salamander surveys are not required. However, surveys may be requested by the Corps, Service, or Applicant on a case by case basis to assist planning for avoidance, minimization, and/or compensation measures. Coordination between all parties should occur prior to requesting a project to be appended to this programmatic biological opinion.

c. Survey guidelines and reporting requirements: https://www.fws.gov/sacramento/es/Survey-Protocols-Guidelines.

5. Compensation proposal including acres and location of the conservation bank, relocation or translocation plan (described under Minimization Measures), and any other pertinent information.

6. Maps showing Sonoma County California tiger salamander breeding site(s) and occurrences, known listed plant occurrences, and conservation banks within a 2-mile radius of the project site. Maps of the project site, project boundary, project impacts, staging areas, species occurrences, and species habitat. Please provide Geographic Information System (GIS) shapefiles if possible. The preferred projection is Universal Transverse Mercator, Zone 10, North American Datum of 1983. Metadata must accompany the file(s) and be compliant with Federal Geographic Data Committee (FGDC) standards (http://www.fgdc.gov).

The Corps will determine whether a proposed project will adversely affect the Sonoma County California tiger salamander and/or its critical habitat, Burke's goldfields, Sebastopol meadowfoam, or Sonoma sunshine. Figures 1-6 and an interactive map (located at www.fws.gov/sacramento/es/Consultation/Programmatic-Consultations) are intended to assist in the evaluation. The Corps will review and forward to the Service all biological and other pertinent information.

The Corps may request a project to be appended to this programmatic biological opinion if there are likely to be adverse effects to the Sonoma California tiger salamander and critical habitat or the three listed plants. The Corps should not request a project be appended to this programmatic biological opinion if there are anticipated effects to an occurrence of any of the three listed plants. The Service considers that one or more of the listed plants is adversely affected when suitable habitat (defined in the Conservation Framework section below) is lost or degraded by activities associated with a Corps' permit, including direct and indirect alteration of wetland hydrology. Projects that may be requested to be appended must include the minimization and conservation measures in the *Description of the Proposed Action* within this programmatic biological opinion.

a. **Electronic Notification.** Once the Corps makes a determination that project inclusion under this Program is appropriate, the Corps will submit information to the Service at CoastBayDivision@fws.gov. The Service will determine if the information submitted by the Corps is complete within 15 working days and append the project within 30 working days. The information may be requested in hardcopy by the Service on a case-by-case basis.

Reporting

1. Pre- and Post - Construction Compliance Reports

For each Corps action appended to this programmatic biological opinion, the Corps will submit a pre - and post-construction compliance report prepared by the Service-approved biologist to the

Sacramento Fish and Wildlife Office (SFWO).

a. The pre-construction compliance report is due within 15 calendar days of scheduled staging and groundbreaking. This report will detail the status of minimization and conservation measures required prior to staging and ground breaking. The Service will confirm compliance or identify outstanding minimization and mitigation measures prior to staging or groundbreaking through electronic mail.

b. The post-construction compliance report is due within 30 calendar days of the date of the completion of construction activity. This report will detail: (1) dates that construction occurred; (2) photo documentation of construction and applicable minimization measures; (3) pertinent information concerning the success of the project in meeting conservation measures and an explanation of failure to meet such measures, if any; (4) documentation of employee environmental education; (5) recommendations to improve minimization measures in future similar projects; and (6) other pertinent information. Refer to additional monitoring and reporting requirements in the Incidental Take Statement below.

2. Capture and Relocation Reporting

For those components of the action that will require the capture and relocation of any listed species, the Corps via the applicant's Service-approved biologist(s) shall immediately contact the SFWO at (916) 414-6623 to report the action. If capture and relocation need to occur after normal working hours, the Corps shall contact the SFWO at the earliest possible opportunity the next working day.

3. Annual Report

In order to monitor whether the amount or extent of incidental take anticipated from implementation of the project is approached or exceeded, the Corps shall adhere to the following reporting requirements. Should this anticipated amount or extent of incidental take be exceeded, the Corps must immediately reinitiate formal consultation as per 50 CFR 402.16.

c. For each project appended to this programmatic biological opinion that will result in habitat degradation or modification whereby incidental take in the form of harm is anticipated, the Corps via the applicant's Service-approved biologist(s) will provide prompt updates to the Service with an accounting of the total acreage of habitat impacted by the project appended to this programmatic biological opinion. The total acreage of habitat impacted by the project shall be compared to the acreage authorized in the Corps permit(s) and appendage to this programmatic biological opinion. The Corps will provide annual updates to the Service with an accounting of the total acreage of habitat impacted by the projects appended to this programmatic biological opinion.

d. For each project appended to this programmatic biological opinion that may result in direct encounters between listed species and project workers and their equipment whereby incidental take in the form of harm, injury, or death is anticipated, the Corps via the applicant's Service-approved biologist(s) shall report the encounter(s) as described in the Description of the Proposed Action section. If encounter occurs after normal working hours, the Corps shall contact the SFWO at the earliest possible opportunity the next working day. When injured or killed individuals of the listed species are found, the Corps shall follow the steps outlined in the Salvage and Disposition of Individuals section below.

Time Period

This programmatic biological opinion is effective for a period of 10 (ten) calendar years from the date of its issuance and can be extended if deemed appropriate by both agencies. The Service will review this programmatic consultation, as appropriate, to ensure that its application is consistent with the minimization and conservation measures outlined in the *Description of the Proposed Action*.

Revocation or Termination

The Corps may end the Program at any time or reinitiate consultation if it determines the Program is not being implemented as intended. Similarly, USFWS may recommend reinitiation of this consultation if the Corps, or the permittees if applicable, fails to provide all applicable notification, reports, etc.

CONSERVATION FRAMEWORK

The minimization and conservation measures in this programmatic biological opinion are based on information from the 2005 Conservation Strategy, 2007 Programmatic Biological Opinion, and 2016 Recovery Plan.

Sonoma County California Tiger Salamander:

The conservation framework is carried over from the 2007 Programmatic Biological Opinion. However, number 2 below is a methodology tailored to new observations of Sonoma County California tiger salamanders.

1. The Conservation Framework is based on Preserve Goals in the Conservation Strategy (Conservation Strategy Team 2005, Table 1, page 6) in anticipation of the amount of habitat expected to be developed (primarily within the urban growth boundaries of the cities of Santa Rosa, Cotati, Rohnert Park, and Windsor).

Burke's goldfields, Sebastopol meadowfoam, and Sonoma sunshine:

Burke's goldfields, Sebastopol meadowfoam, and Sonoma sunshine seed banks can remain dormant in the soil for many years, in natural and disturbed habitats. Some CNDDB occurrences have been considered extirpated but then subsequently plants have been observed several years later and are now considered extant (CNDDB 2018). Endangered plant surveys in suitable habitat may not detect flowering plants during the 2 year survey protocol timeframe, although there can be a seedbank present. Suitable habitat includes: 1) wetland(s) containing surface water (standing or flowing) during the rainy season in a normal rainfall year for 7 or more consecutive days; or 2) wetland(s) that have an outlet barrier (i.e. is a pool) or occur in depressional terrain (i.e. is a swale or drainage feature); and 3) seasonal wetlands located within a Core or Management Area (Service 2007 and 2016). The conservation framework for Burke's goldfields, Sebastopol meadowfoam, and Sonoma sunshine is the following.

1. Conservation for impacts to suitable habitat where a seed bank may be present is carried over from the 2007 Programmatic Biological Opinion and applies when the conservation occurs in the same Core Area (Recovery Plan 2016) as where the impacts occur. However, a higher ratio will apply when conservation is located in a different Core Area because the goal for recovery is to maintain the geographic distribution of the range of these species within

the Santa Rosa Plain (Figures 3 – 5). The applicable ratio will be as described in Table 3 herein.

BIOLOGICAL OPINION

This programmatic biological opinion provides the framework for the Corps to meet its Endangered Species Act Section 7(a)(2) requirements for permitting projects that adversely affect Burke's goldfields, Sebastopol meadowfoam, Sonoma sunshine, Sonoma County California tiger salamander and Sonoma County California tiger salamander critical habitat. It is intended to provide a mechanism for the Corps to permit projects that cause incidental take (i.e., Sonoma County California tiger salamander), and result in habitat loss, fragmentation, and degradation of habitat for Burke's goldfields, Sebastopol meadowfoam, Sonoma sunshine, Sonoma County California tiger salamander, and Sonoma County California tiger salamander critical habitat. This in turn will allow the goals, objectives, and recovery criteria of the Recovery Plan to be achieved, and ensure that Sonoma California tiger salamander critical habitat will maintain its conservation value. After reviewing the proposed action with programmatic actions as proposed by the Corps, the Service has determined that the proposed actions presents a programmatic action, as defined in 50 CFR § 402.2.

Description of the Proposed Action

The federal action on which we are consulting is the Corps' issuance of Clean Water Act, Section 404 permits in the Santa Rosa Plain *Action Area* (Figure 1). These permits are issued for projects such as residential and commercial development projects, rural residential, road improvements, and other miscellaneous infrastructure and ground disturbing activities.

Fill of Wetlands and Modification/Loss of Adjacent Uplands

We expect the majority of projects will be within the urban growth boundaries of the Cities of Santa Rosa, Cotati and Rohnert Park (Table 1) (Conservation Strategy Team 2005). They will consist of filling wetlands and modifying and removing adjacent uplands to build homes, industrial units, roads, and infrastructure. Some smaller projects involving wetland fill and modification/loss of adjacent uplands may occur outside of the urban growth boundaries within the *Action Area* due to rural residential, road, and other miscellaneous projects within Sonoma County jurisdiction. The acreages in Table 1 below were developed with the assistance of staff from each city during the development of the Conservation Strategy.

Table 1. Estimated Development Within City Urban Growth Boundaries

	Santa Rosa (acres)	**Cotati** (acres)	**Rohnert Park** (acres)	**Estimated Mitigation** (acres)
0 - 500 feet of a California tiger salamander breeding occurrence	190.4	21	0	**634.2**
501 - 2200 feet of a California tiger salamander breeding site	761.4	132.2	13.9	**1815**
2201 feet - 1.3 miles of a known California tiger salamander breeding site	411.7	6.7	166.6	**585**
500 feet of a California tiger salamander non-breeding occurrence	177	43.3	22.3	**485.2**
Total	**1540.5**	**203.2**	**202.8**	**3519.4**

Anticipated permanent loss of Sonoma County California tiger salamander habitat within city urban growth boundaries was compared with the acreage needed to conserve habitat and maintain viable populations within identified Conservation Areas of the Conservation Strategy (Conservation Strategy Team 2005). This comparison was used to calculate the ratio of mitigation for project impacts in order to meet conservation goals (Conservation Strategy Team 2005). These estimates were anticipated to occur within a 10 year time period (i.e., 2005 - 2015) (Conservation Strategy Team 2005), however due to the economic downturn beginning around 2008, the estimated development did not occur as anticipated. It is difficult to know exactly when this build out will occur.

Suitable wetland habitat for Burke's goldfields, Sebastopol meadowfoam, and Sonoma sunshine exists within the areas expected to be impacted by development in Table 1 but has not been quantified. The habitat is expected to be developed, fragmented, and degraded by activities associated with Corps permits. The amount of suitable wetland habitat that will be affected by a Corps permit action/proposed project will be determined on a project by project basis by the Corps.

Minimization Measures and Best Management Practices

Several of the minimization measures contained in the Conservation Strategy (Conservation Strategy Team. 2005) and in the 2007 Programmatic Biological Opinion (Service 2007) have been updated herein to reflect current knowledge and more effectively minimize adverse effects of project activities. Projects that qualify to be appended to this programmatic biological opinion must incorporate the following Conservation Measures as part of the Project Description. The Corps proposes to implement the following measures which can be modified or waived by the Service in writing on a case by case basis.

Burke's Goldfields, Sebastopol Meadowfoam and Sonoma Sunshine

1. Construction Worker Training. A qualified biological monitor will conduct a training session for all construction workers before work is started on the project. The training program is for all construction personnel including contractors and subcontractors. The training will include, at a minimum, a description of the Sonoma County California tiger salamander, and the applicable listed plant(s) and their habitat within the *Action Area*; an explanation of the species' status and protection under state and federal laws; the avoidance and minimization measures to be implemented to reduce loss of these species; and communication and work stoppage procedures in case a listed species is observed within the *Action Area*. A fact sheet conveying this information will be prepared and distributed to all construction personnel. The Applicant shall provide interpretation for non-English speaking workers.

2. Work Area. Access routes, number and size of staging areas, and work areas, will be limited to the minimum necessary to achieve the project goals. Routes and boundaries of the roadwork will be clearly marked prior to initiating construction/grading. Environmentally Sensitive Areas (ESA's) containing sensitive habitats adjacent to or within construction work areas for which physical disturbance is not allowed will be clearly delineated using high visibility orange fencing. The final project plans will depict all locations where ESA fencing will be installed and will provide installation specifications. The bid solicitation package will include special provisions and clearly describe acceptable fencing material and prohibited construction-related activities including vehicle operation, material and equipment storage, access roads and other surface-disturbing activities within ESAs. The ESA fencing will remain in place throughout the duration of the proposed action, while construction activities

are ongoing, and will be regularly inspected and fully maintained at all times. The orange fencing will be removed promptly after project completion.

3. Equipment. All equipment will be maintained such that there will be no leaks of automotive fluids such as gasoline, oils, or solvents. Spill response kits will be on hand and utilized immediately in the case of mechanical failures resulting in gasoline or oil spills.

4. Reduce Spread of Invasive Species. A qualified biologist shall ensure that the spread or introduction of invasive non-native plant species, via introduction by arriving vehicles, equipment, and other materials will be prevented, by thoroughly cleaning equipment and vehicles prior to start of use. Any new piece of equipment brought in, or any piece of equipment taken off site and then returned to the site, will also be washed. When practicable, invasive non-native plants in the project area shall be removed and properly disposed of in a manner that will not promote their spread. Invasive non-native plant species include those identified in the California Invasive Plant Council's (Cal-IPC) Inventory Database, accessible at: www.cal-ipc.org/ip/inventory/index.php. Areas subject to invasive non-native weed removal or disturbance will be replanted with appropriate mix of fast-growing native species.

5. Hazardous Materials. Hazardous materials such as fuels, oils, solvents, etc., will be stored in sealable containers in a designated location that is at least 200 feet from aquatic habitats. All fueling and maintenance of vehicles and other equipment and staging areas will occur at least 200 feet from any aquatic habitat.

6. Restoration Plan. Project areas temporarily disturbed by construction activities will be re-vegetated with locally-occurring native plants appropriate for the region and habitat communities on site. All temporarily affected areas shall be returned to original grade and contours to the maximum extent practicable and protected with proper erosion control materials. Seed from commercial nurseries will not be planted in vernal pools. A Restoration Plan with success criteria will be submitted to the Service for review and approval prior to ground disturbance.

7. Onsite Project Manager. The Corps through its Applicant will ensure the Onsite Project Manager or their designee will have full authority to implement and enforce all onsite Conservation Measures and Terms and Conditions of this programmatic biological opinion and appendage. The Onsite Foreman/Manager or their designee shall maintain a copy of this programmatic biological opinion and appendage onsite whenever construction is in progress. Their name(s) and telephone number(s) shall be provided to the Service at least 15 calendar days prior to groundbreaking at the project.

8. Biological Monitor Approval and Stop Work Authority. Qualified biological monitor(s) will possess a working wireless/mobile phone whose number will be provided to the Service prior to the start of construction and ground disturbance. The biological monitor(s) shall keep a copy of this programmatic biological opinion and appendage in his/her possession when onsite. Through the Onsite Project Manager or his/her designee, the biological monitor(s) shall be given the authority to communicate verbally, by telephone, email, or hardcopy with the applicant, project personnel, and any other person(s) at the project site or otherwise associated with the project to ensure that the Terms and Conditions of this programmatic biological opinion and appendage are met. The biological monitor(s) shall have oversight over implementation of the Terms and Conditions in this programmatic biological opinion and appendage, and shall have the authority to stop project activities if they determine any of the associated requirements are not being fulfilled. If the biological

monitor exercises this authority, the Service shall be notified by telephone and email within 24 hours. The Service contact is the Coast Bay Division Chief of the Endangered Species Program, Sacramento Fish and Wildlife Office at telephone number (916) 414-6623.

9. Stormwater Pollution Prevention Plan (SWPPP). A SWPPP will be prepared in full accordance with the State Water Resources Control Board, National Pollutant Discharge Elimination System Construction General Permit. The SWPPP will include Best Management Practices (BMPs) for controlling sediment, turbidity and the release of other pollutants into water courses during construction. The SWPPP will also include a rainy season erosion prevention and monitoring plan to ensure that surface runoff from the construction site meets Regional Water Quality Control Board (RWQCB) water quality standards and objectives for the Hydrologic Unit and Hydrologic Subunit in which the Project is located. The SWPPP is subject to the approval of the RWQCB prior to the start of work.

Sonoma County California Tiger Salamander

Implementation of these minimization measures may vary based on environmental factors and site location as determined by the Service.

1. Wildlife Exclusion Fencing (WEF). Prior to the start of construction, WEF will be installed at the edge of the project footprint in all areas where Sonoma County California tiger salamanders could enter the construction area. WEF with exit ramps, funnels, and cover boards may be required for one full rainy season to allow any Sonoma County California tiger salamander onsite to move into an adjacent habitat offsite and will be determined on a case by case basis.

   The location of the fencing shall be determined by the onsite project manager and the Service-approved biologist in cooperation with the Service prior to the start of staging or surface disturbing activities. A conceptual fencing plan shall be submitted to the Service for review and approval prior to WEF installation. The location, fencing materials, installation specifications, and monitoring and repair criteria shall be approved by the Service prior to start of construction. The applicant shall include the WEF specifications on the final project plans. The applicant shall include the WEF specifications including installation and maintenance criteria in the bid solicitation package special provisions. The WEF shall remain in place throughout the duration of the project and shall be inspected weekly and fully maintained. Repairs to the WEF shall be made within 24 hours of discovery. Upon project completion the WEF shall be completely removed, the area cleaned of debris and trash, and returned to natural conditions.

   An exception to the foregoing fencing measure is that for work sites where the duration of work activities is very short (e.g., 3 days or less) and during the dry season. If installation will result in more ground disturbance than project activities, then the boundaries and access areas and sensitive habitats may be staked and flagged by the biological monitor prior to disturbance and species monitoring would occur during all project activities at that site.

2. Relocation Plan. The Corps through its Applicant shall prepare and submit a Relocation Plan for the Service's written approval. The Relocation Plan shall be consistent with the Guidelines for the relocation of California tiger salamanders (*Ambystoma californiense*) (Shaffer et. al. 2008). The Relocation Plan shall contain the name(s) of the Service-approved biologist(s) to relocate Sonoma County California tiger salamanders, method of relocation (if

different than number 3 below), a map, and description of the proposed release site(s) and burrow(s), and written permission from the landowner to use their land as a relocation site. At various times, a conservation bank may be a desired location to relocate Sonoma County California tiger salamanders from a salvage site; however no conservation bank may receive relocated Sonoma County California tiger salamanders until all the bank's credits have been sold to prevent interfering with their performance criteria and credit release schedule.

3. Protocol for Species Observation, Handling, and Relocation. Only Service-approved biologists shall participate in activities associated with the capture, handling, relocation, and monitoring of Sonoma County California tiger salamanders. If a Sonoma County California tiger salamander is encountered, work activities within 50 feet of the individual shall cease immediately and the Onsite Project Manager and Service-approved biologist shall be notified. Based on the professional judgment of the Service-approved biologist, if project activities can be conducted without harming or injuring the individual(s), it may be left at the location of discovery and monitored by the Service-approved biologist. All project personnel shall be notified of the finding and at no time shall work occur within 50 feet of the Sonoma County California tiger salamander without a Service-approved biologist present. If relocation of the species to another site has been approved by the Service and CDFW prior to the start of the Project, the following steps shall be followed:

    a. Prior to handling and relocation, the Service-approved biologist will take precautions to prevent introduction of amphibian diseases in accordance with the *Interim Guidance on Site Assessment and Field Surveys for Determining Presence or a Negative Finding of the California Tiger Salamander* (Service 2003). Disinfecting equipment and clothing is especially important when biologists are coming to the *Action Area* to handle amphibians after working in other aquatic habitats. Sonoma County California tiger salamanders shall also be handled and assessed according to the Restraint and Handling of Live Amphibians (USGS National Wildlife Health Center 2001).

    b. Sonoma County California tiger salamanders shall be captured by hand, dipnet, or other Service-approved methodology, transported, relocated and released as soon as practicable the same day of capture. Individuals should be relocated to areas with one or more potential breeding pools and an active burrow system (unless otherwise with written approved by the Service). The Service shall be notified within 24 hours of all capture, handling, and relocation efforts.

    c. If an injured Sonoma County California tiger salamander is encountered and the Service-approved biologist determines the injury is minor or healing and the salamander is likely to survive, the salamander shall be released as soon as possible, in accordance with the Service-approved Relocation Plan. The relocated Sonoma County California tiger salamander shall be monitored until it is determined that it is not threatened by predators or other dangers.

    d. If the Service-approved biologist determines that the Sonoma County California tiger salamander has serious injuries as a result of project-related activities the Service-approved biologist shall immediately take it to a licensed veterinarian, the Sonoma County Wildlife Rescue, or another Service-approved facility. If taken into captivity the individual shall remain in captivity and not be released into the wild unless it has been kept in quarantine and the release is authorized by the Service. The Applicant shall bear any costs associated with the care or treatment of such injured individuals.

The circumstances of the injury, the procedure followed and the final disposition of the injured animal shall be documented in a written incident report.

e. Notification to the Service of an injured or dead Sonoma County California tiger salamander in the *Action Area* will be made within 2 calendar days of the finding. Written notification to the Service shall include the following information: the species, number of animals taken or injured, sex (if known), date, time, location of the incident or of the finding of a dead or injured animal, how the individual was taken, photographs of the specific animal, the names of the persons who observe the take and/or found the animal, and any other pertinent information. Dead specimens will be preserved, as appropriate, and held in a secure location until instructions are received from the Service regarding the disposition of the specimen.

4. Biological Monitors. Qualified biological monitor(s) will be on site each day during all earth moving activities. The biological monitor(s) shall conduct clearance surveys at the beginning of each day and regularly throughout the workday when construction activities are occurring that may displace, injure, or kill Sonoma County California tiger salamanders through contact with workers, vehicles, and equipment. All aquatic and upland habitat including refugia habitat such as small woody debris, refuse, burrow entries, etc., shall be duly inspected. Where feasible and only on a case-by-case basis, rodent burrows and other ground openings suspected to contain Sonoma County California tiger salamanders that would be destroyed from project activities may be carefully excavated with hand tools. Pre-soaking the area prior to ground disturbance may also increase emergence of the species for translocation. The Service will consider the implementation of specific project activities without the oversight of an on-site biological monitor on a case-by-case basis.

   Before the start of work each day, the biological monitor will check for animals under all equipment such as vehicles and stored pipes. The biological monitor will check all excavated steep-walled holes or trenches greater than one foot deep for any Sonoma County California tiger salamanders. Sonoma County California tiger salamanders will be removed by the biological monitor and relocated according to the Relocation Plan. To prevent inadvertent entrapment of animals during construction, all excavated, steep-walled holes or trenches more than 6 inches deep will be covered with plywood (or similar materials) that leave no entry gaps at the close of each working day or provided with one or more escape ramps constructed of earth fill or wooden planks. The Service-approved biologist shall inspect all holes and trenches at the beginning of each workday and before such holes or trenches are filled. All replacement pipes, culverts, or similar structures stored in the project footprint overnight will be inspected before they are subsequently moved, capped, and/or buried.

5. Biological Monitoring Records. The biological monitor(s) shall maintain monitoring records that include: (1) the beginning and ending time of each day's monitoring effort; (2) a statement identifying the listed species encountered, including the time and location of the observation; (3) the time the specimen was identified and by whom and its condition; (4) the capture and release locations of each individual; (5) photographs and measurements (snout to vent and total length) of each individual; and (6) a description of any actions taken. The biological monitor(s) shall maintain complete records in their possession while conducting monitoring activities and shall immediately provide records to the Service upon request. All monitoring records shall be provided to the Service within 30 days of the completion of monitoring work.

6. Work Windows. Ground disturbance will be conducted between April 15 and October 15, of any given year, depending on the level of rainfall and/or site conditions. However, grading and other disturbance in pools and ponds, if unavoidable, shall be conducted only when dry, typically between July 15 and October 15. Work within a pool or wetland may begin prior to July 15 if the pool or wetland has been dry for a minimum of 30 days prior to initiating work. Any work in pools and wetlands that are holding water shall be subject to approval of the Service. If work must continue when rain is forecast (greater than 40 percent chance of rain), a Service-approved biologist(s) shall survey the Project site before construction begins each day rain is forecast. If rain exceeds 0.5 inches during a 24-hour period, work shall cease until National Weather Service forecasts no further rain. This restriction is not applicable for areas within 1.3 miles of potential or known Sonoma County California tiger salamander breeding sites once the Applicant encircles the site with Wildlife Exclusion Fencing.

7. Proper Use of Erosion Control Materials. Plastic or synthetic monofilament netting will not be used in order to prevent Sonoma County California tiger salamanders from becoming entangled, trapped, or injured. This includes products that use photodegradable or biodegradable synthetic netting, which can take several months to decompose. Acceptable materials include natural fibers such as jute, coconut, twine or other similar fibers. Following site restoration, any materials left behind as part of the restoration, such as straw wattles, should not impede movement of this species.

8. Wildlife Passage Improvement. When constructing a road improvement, wherever possible, the Corps through the Applicant will enhance or construct wildlife passage for the Sonoma County California tiger salamander across roads, highways, or other anthropogenic barriers. This includes upland culverts, tunnels, and other crossings designed specifically for wildlife movement, as well as making accommodations in curbs, median barriers, and other impediments to terrestrial wildlife movement at locations most likely to provide a net benefit to wildlife.

9. Vegetation Removal. A Service-approved biologist will be present during all vegetation clearing and grubbing activities. Grasses and weedy vegetation should be mowed to a height no greater than 6 inches prior to ground-disturbing activities. All cleared vegetation will be removed from the project footprint to prevent attracting animals to the project site. Prior to vegetation removal, the Service-approved biologist shall thoroughly survey the area for Sonoma County California tiger salamanders. Once the qualified biologist has thoroughly surveyed the area, clearing and grubbing may continue without further restrictions on equipment; however, the qualified biologist shall remain onsite to monitor for Sonoma County California tiger salamanders until all clearing and grubbing activities are complete.

10. Nighttime Activities. Construction and ground disturbance will occur only during daytime hours, and will cease no less than 30 minutes before sunset and will not begin again prior to no less than 30 minutes after sunrise. Night lighting of Environmental Sensitive Areas should be avoided.

11. Avoidance of Entrainment. If a water body (e.g., pond or ditch) is to be temporarily dewatered by pumping, intakes shall be completely screened with wire mesh smaller than 5 millimeters and intake placed within a perforated bucket or other method to attenuate suction to prevent Sonoma County California tiger salamander larvae from entering the pump system. Pumped water shall be stored in a manner that does not degrade water quality and then upon completion released back into the water body, or at an appropriate location in

a manner that does not cause erosion. No rewatering of the water body is necessary if sufficient surface or subsurface flow exists to fill it within a few days, or if work is completed during the time of year the water body would have dried naturally, or for predator control purposes. To avoid effects to eggs and larvae, work within breeding ponds should be conducted between August 31 and October 31, or when the pools have been dry at least 30 days. When working in breeding ponds, this measure is to be implemented after implementing the required Relocation Plan described in number 2 above.

12. Reduce Non-Native Aquatic Predators/Competitors. A qualified individual shall permanently remove, from within the project area, any individuals of non-native species, such as bullfrogs, crayfish, and centrarchid fishes, to the maximum extent possible. The Applicant shall have the responsibility to ensure that these activities are in compliance with the California Fish and Game Code. For long-term management of aquatic breeding habitat, avoid converting seasonal breeding aquatic habitat to perennial aquatic breeding habitat, to avoid colonization by predators and non-native tiger salamanders or hybrids. Creation of new perennial water bodies in the vicinity of Sonoma County California tiger salamander shall also be avoided.

13. Trash. All foods and food-related trash items will be enclosed in sealed trash containers at the end of each day, and removed from the site every three days.

14. Agency Access. If verbally requested before, during, or upon completion of ground disturbance and construction activities, the Applicant will ensure the Service can immediately and without delay, access and inspect the project site for compliance with the project description, Conservation Measures, and reasonable and prudent measures of this programmatic biological opinion and appendage, and to evaluate project effects to the Sonoma County California tiger salamander and its habitat.

MEETING CONSERVATION NEEDS OF LISTED SPECIES

The conservation framework in this programmatic biological opinion utilizes information from the 2005 Conservation Strategy, 2007 Programmatic Biological Opinion, and 2016 Recovery Plan. Projects that can be appended to this programmatic biological opinion will meet the following conservation goals prior to beginning project activities and ground disturbance.

Sonoma County California tiger salamander

The conservation strategy for the Sonoma California tiger salamander is carried over from the 2007 Programmatic Biological Opinion. The approach is based on ensuring that issuance of Corps permits does not preclude achieving the acreage goals in the Conservation Strategy which is generally based on a comparison of the amount of habitat expected to be developed (primarily within the urban growth boundaries of the cities of Santa Rosa, Cotati, Rohnert Park, and Windsor) and the Sonoma County California tiger salamander Preserve Goals (Conservation Strategy Team 2005, Table 1, page 19) within the defined Conservation Areas.

Development projects that can be appended to this programmatic biological opinion will provide the following to be consistent with the conservation framework for the Sonoma County California tiger salamander:

1. Mitigation Ratios. Conservation to offset adverse effects to Sonoma County California tiger salamander habitat will be in accordance to Table 2 and Figure 1. The mitigation ratios are

expressed as acres to be conserved to acres of impact. Ratios apply to the entire area subject to direct and indirect effects. Project sites that fall within more than one ratio will mitigate at the higher ratio in most cases, unless other conservation measures provide equal or greater conservation value. An interactive map is available to search by address or assessor parcel number (fws.gov/sacramento/es/Consultation/Programmatic-Consultations/).

Table 2. Mitigation Ratios for the Sonoma County California Tiger Salamander

Mitigation Ratio	Sonoma County California tiger salamander
3:1	Project sites that are within 500 feet of a breeding site.
2:1	• Project sites that are greater than 500 feet and within 2,200 feet of a breeding site. • Project sites beyond 2,200 feet from a breeding site, but within 500 feet of a non-breeding occurrence.
1:1	Project sites that are greater than 2,200 feet and within 6,864 feet (1.3 miles) of a breeding site.
0.2:1	Project sites that are greater than 6,864 feet (1.3) miles from a breeding site and greater than 500 feet from a non-breeding occurrence.

2. Conservation Bank Credits. Conservation for the Sonoma County California tiger salamander can be achieved by purchasing credits at a Service-approved conservation bank.

3. Conservation Bank Location. The selection of sites for mitigation will be consistent with the Recovery Plan as follows:

    a. For impacts to Sonoma County California tiger salamander located in a Core Area, conservation will be within the same Core Area as first priority in order to maintain the current geographic, elevational, and ecological distribution (Service 2016). Conservation at a different Core Area or Management Area can be considered on a case by case basis as a second option but must be coordinated and approved by the Corps and Service.

    b. For impacts to Sonoma County California tiger salamander located in a Management Area, conservation may be implemented within the same Management Area or the nearest Core Area.

Sonoma sunshine, Sebastopol meadowfoam, and Burke's goldfields

Conservation for Burke's goldfields, Sebastopol meadowfoam, and Sonoma sunshine under this programmatic biological opinion is similar to the 2007 Programmatic Biological Opinion with one substantial change. This revised programmatic biological opinion does not cover projects that adversely affect CNDDB occurrences (Figures 3 – 5). However, this programmatic biological opinion covers adverse effects to suitable habitat where a seed bank is likely to be present. Suitable habitat includes: 1) wetland(s) containing surface water (standing or flowing) during the rainy season in a normal rainfall year for 7 or more consecutive days; 2) wetland(s) that have an outlet barrier (i.e., is a pool) or occurs in depressional terrain (i.e., is a swale or drainage feature); and 3) seasonal wetlands located within a Core or Management Area (Service 2007 and 2016).

Development projects that can be appended to this programmatic biological opinion will offset adverse effects to listed plant suitable habitat and will implement the following conservation measures:

1. Mitigation Ratios. Conservation for direct and indirect impacts to suitable habitat will be in accordance with Table 3. The ratios are expressed as acres of conservation to acres of impact.

Table 3. Mitigation Ratios for the Listed Plants

Burke's goldfields, Sebastopol meadowfoam and Sonoma sunshine	**Mitigation ratio Same Core Area as Impacts**	**Mitigation ratio Different Core Area as Impacts**
Impacts to suitable habitat	1.5 : 1	3 : 1

2. Conservation Bank Credits. Mitigation for Burke's goldfields, Sebastopol meadowfoam, or Sonoma sunshine can be achieved by purchasing credits at a Service-approved conservation bank.

3. Determining Which Species to Conserve. The plant species to be conserved will be determined as described below.

    a. Proximity to a Species Occurrence: Suitable habitat will be conserved for the species that occurs nearest to the project site based on CNDDB occurrences (Figures 3 – 5). For example, project sites near the Town of Windsor have numerous occurrences of Burke's goldfields. Therefore, Burke's goldfields would be the species chosen for conservation.

    b. Multiple Species Occurrences Within a Core Area: Conservation for impacts to suitable habitat located within the Core Area of more than one listed plant species must be equally apportioned between those listed plant species (e.g., If there will be 1 acre of impacts to suitable habitat located in Sonoma sunshine and Burke's goldfields Core Areas, then 0.5 acre of Sonoma sunshine and 0.5 acre of Burke's goldfields will be subject to conservation goals in Table 3). This latter conservation strategy equalizes conservation to best meet the conservation needs of the species as outlined in the Recovery Plan.

4. Conservation Bank Location. The selection of sites for conservation will be consistent with conservation objectives for each species in the Recovery Plan as follows:

    a. Project Sites in a Core Area: For impacts to suitable listed plant habitat located in a Core Area, conservation will be within the same Core Area as first priority in order to maintain the current geographic, elevational, and ecological distribution (Service 2016). Conservation in a different Recovery Plan Core or Management area can be considered on a case by case basis as a second option but must be coordinated with and approved by the Corps and Service.

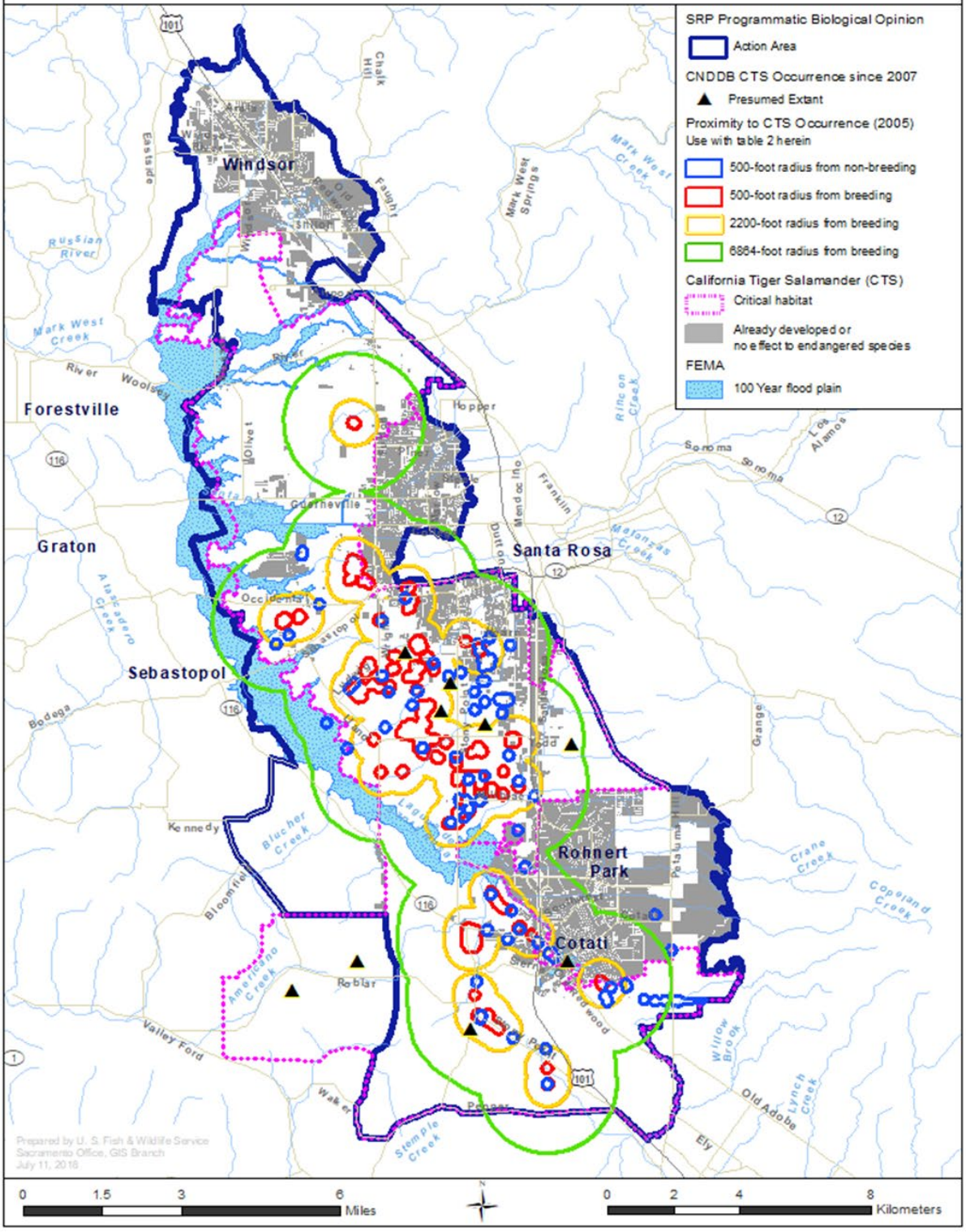
    b. Project Sites in a Management Area: For impacts to suitable listed plant habitat located in a Management Area, conservation may be implemented within the same Management Area or the nearest Core Area.

Action Area

The *Action Area* is defined in 50 CFR § 402.02, as "all areas to be affected directly or indirectly by the federal action and not merely the immediate area involved in the action." For this programmatic

biological opinion, the *Action Area* includes an area of 66,899 acres on the Santa Rosa Plain as shown in Figure 1.

Figure 1: Santa Rosa Plain (SRP) Action Area



Analytical Framework for the Jeopardy Determination

Section 7(a)(2) of the Act requires that federal agencies ensure that any action they authorize, fund, or carry out is not likely to jeopardize the continued existence of listed species. "Jeopardize the continued existence of" means to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species (50 CFR § 402.02).

The jeopardy analysis in this biological opinion considers the effects of the proposed federal action, and any cumulative effects, on the rangewide survival and recovery of the listed species. It relies on four components: (1) the *Status of the Species*, which describes the current rangewide condition of the species, the factors responsible for that condition, and its survival and recovery needs; (2) the *Environmental Baseline*, which analyzes the current condition of the species in the *Action Area* without the consequences to the listed species caused by the proposed action, the factors responsible for that condition, and the relationship of the *Action Area* to the survival and recovery of the species; (3) the *Effects of the Action*, which determines all consequences to listed species that are caused by the proposed federal action; and (4) the *Cumulative Effects*, which evaluates the effects of future, non-federal activities in the *Action Area* on the species. The *Effects of the Action* and *Cumulative Effects* are added to the *Environmental Baseline* and in light of the status of the species, the Service formulates its opinion as to whether the proposed action is likely to jeopardize the continued existence of the listed species.

Analytical Framework for the Adverse Modification Determination

Section 7(a)(2) of the Act requires that federal agencies insure that any action they authorize, fund, or carry out is not likely to destroy or to adversely modify designated critical habitat. A final rule revising the regulatory definition of "destruction or adverse modification" (DAM) was published on August 27, 2019 (84 (84 FR 44976). The final rule became effective on October 28, 2019. The revised definition states:

> "*Destruction or adverse modification* means a direct or indirect alteration that appreciably diminishes the value of critical habitat as a whole for the conservation of a listed species".

The DAM analysis in this biological opinion relies on four components: (1) the *Status of Critical Habitat*, which describes the current rangewide condition of the critical habitat in terms of the key components (i.e., essential habitat features, primary constituent elements, or physical and biological features) that provide for the conservation of the listed species, the factors responsible for that condition, and the intended value of the critical habitat overall for the conservation/recovery of the listed species; (2) the *Environmental Baseline*, which analyzes the current condition of the critical habitat in the *Action Area*, without the consequences to designated critical habitat caused by proposed action, the factors responsible for that condition, and the value of the critical habitat in the *Action Area* for the conservation/recovery of the listed species; (3) the *Effects of the Action*, which determines all consequences to designated critical habitat that are caused by the proposed federal action on the key components of critical habitat that provide for the conservation of the listed species, and how those impacts are likely to influence the conservation value of the affected critical habitat; and (4) *Cumulative Effects*, which evaluate the effects of future non-federal activities that are reasonably certain to occur in the *Action Area* on the key components of critical habitat that provide for the conservation of the listed species and how those impacts are likely to influence the conservation value of the affected critical habitat.

The *Effects of the Action* and *Cumulative Effects* are added to the *Environmental Baseline* and in light of the status of critical habitat, the Service formulates its opinion as to whether the action is likely to destroy or adversely modify designated critical habitat. The Service's opinion evaluates whether the action is likely to impair or preclude the capacity of critical habitat in the *Action Area* to serve its intended conservation function to an extent that appreciably diminishes the rangewide value of critical habitat for the conservation of the listed species. The key to making that finding is understanding the value (i.e., the role) of the critical habitat in the *Action Area* for the conservation/recovery of the listed species based on the *Environmental Baseline* analysis.

Status of the Species and Environmental Baseline

Environmental baseline refers to the condition of the listed species or its designated critical habitat in the action area, without the consequences to the listed species or designated critical habitat caused by the proposed action. The environmental baseline includes the past and present impacts of all Federal, State, or private actions and other human activities in the action area, the anticipated impacts of all proposed Federal projects in the action area that have already undergone formal or early section 7 consultation, and the impact of State or private actions which are contemporaneous with the consultation in process. The consequences to listed species or designated critical habitat from ongoing agency activities or existing agency facilities that are not within the agency's discretion to modify are part of the environmental baseline.

Sonoma County California Tiger Salamander; Burke's Goldfields; Sebastopol Meadowfoam; and Sonoma Sunshine

Additional information on the status of these species beyond the *Action Area* covered in this document can be found in the Recovery Plan (Service 2016).

The *Action Area* is located in central Sonoma County, California, within the Santa Rosa Plain sub-basin of the Santa Rosa Valley and the Petaluma Valley. Prior to human settlement, it is believed the Santa Rosa Plain supported a vast network of seasonally wet swales and scattered pools within a matrix of grassland and oak savanna. The low-gradient terrain with underlying dense clay soil horizons and high clay soil surfaces, ample winter precipitation, and dry summer climate on the Santa Rosa Plain predisposed this area to the development of seasonal wetlands. The natural landscape historically consisted of numerous shallow depressions that would pond water during the rainy season (vernal pools), often connected by narrow swales. Much of the vernal pool ecosystem has since been lost or degraded through agricultural activities and development projects (Patterson et al.1994, CH2M Hill 1995). The Santa Rosa Plain is believed to have historically supported approximately 7,000 acres of seasonal wetlands, an estimated 84 percent of which had been lost due to land conversion as of 1994. The approximately 1,000 acres of seasonal wetlands that remained on the Santa Rosa Plain in 1994 were composed of both vernal pools (ponded) and swales (non-ponded) in roughly equal proportions, and the swales had largely been invaded by exotic species, therefore it is believed the actual amount of vernal pool acreage had been reduced to less than a few hundred acres (Patterson et al., 1994). Because the vernal pool ecosystem was once extensive over the Santa Rosa Plain, it is not difficult to find parcels on which vernal pools have been smeared into the landscape, resulting in degraded seasonal wetlands that may still retain the necessary qualities for supporting one or more of the listed plant species but may require considerable restoration to ensure long-term species viability (Patterson et al.1994, CH2M Hill 1995).

The loss of seasonal wetland habitat on the Santa Rosa Plain has largely resulted from urban and agricultural conversion (Patterson et al. 1994, CH2M Hill 1995, CNDDB 1998). Of

28,000 acres of the Santa Rosa Plain studied by Waaland et al. (1990 as cited in Patterson et al. 1994), 12,000 acres had been converted to urban, cropland, orchard or vineyard uses. The conversion most severely affected oak woodland/savanna-vernal pool habitat.

During the past 40 years, the Santa Rosa Plain has changed from a primarily rural residential/agricultural area with large expanses of open space to a more urbanized and intensely agricultural area with less open space (Service 2016). Vernal pool habitat on the Santa Rosa Plain now occurs as often degraded remnants in a matrix of agriculture, development, and fragmented remains of valley oak woodland, grassland, and persistent wetland vegetation, and is vulnerable to invasion by non-native plants (City of Santa Rosa 2014). An undetermined amount of land use conversions and intensive and routine agricultural practices are not reviewed for environmental compliance under the federal permitting process. It is expected that some new intensive agriculture including vineyard, row crops, cannabis grows, recycled water spray irrigation, and their infrastructure will occur within the Action Area.

The Association of Bay Area Governments (ABAG) predicts that between 2010 and 2040 the nine-county San Francisco Bay Area region is projected to add 2.1 million people and 660,000 homes. During that time, the human population in Sonoma County, one of the Bay Area counties, is projected to increase by 24 percent and housing will increase by 16 percent, with 82 percent of the County's projected growth occurring within the jurisdictions in the Santa Rosa Plain, largely within urban growth boundaries of Cotati, Rohnert Park, Santa Rosa, and Windsor (ABAG 2013). Areas within the defined urban growth boundaries include lands currently inhabited by Sonoma County California tiger salamander, Burke's goldfields, Sebastopol meadowfoam, and Sonoma sunshine. Urban growth continues to imperil the Sonoma County California tiger salamander and the three listed plant species with ongoing habitat loss and fragmentation.

Intensive and less intensive agriculture uses occur within the *Action Area*. Some of the intensive agriculture includes vineyards, row crops, orchards, dairies, and recycled water spray irrigation. There are approximately 6,571 acres of vineyards in the *Action Area* (Sonoma Veg Map 2013). Conversion of pastures to vineyards is a current threat to all four species (Service 2016).Vineyard project applicants within the Santa Rosa Plain are expected to develop biological assessments for review by Sonoma County environmental staff. Sonoma County was a partner in preparing the Conservation Strategy (2005) and are expected to conserve these species accordingly. The Sonoma County environmental review for vineyard and orchard development expanded in 2014 with the requirement that projects have a biological assessment completed and mitigate impacts to endangered species as well as sensitive aquatic habitats such as streams, wetlands and vernal pools (Sonoma County 2016).

Land uses within the *Action Area* are expected to continue to include urban, rural residential, intensive agriculture, endangered species compatible agriculture, transportation, and conservation. Conservation lands for Sonoma County California tiger salamander, Burke's goldfields, Sonoma sunshine, and Sebastopol meadowfoam, have been established on the Santa Rosa Plain since the plants were federally listed as endangered in 1991 and Sonoma County California tiger salamander in 2002. All are protected and have funding mechanisms such as endowment funds for the perpetual management of the habitat to ensure the survival of the listed species present. The conservation lands summarized in Table 4 of the Recovery Plan (Service 2016) are fairly small and interspersed with rural residential, vineyards, and other agriculture land uses. The majority are less than 50 acres in size (77 percent).

Voters in local municipalities have established urban growth boundaries for their communities. This is intended to accomplish the goal of city-centered growth, resulting in continuation of rural and agricultural land uses between the urbanized areas (Conservation Strategy Team 2005). Areas within

the defined urban growth boundaries include lands currently inhabited by Sonoma County California tiger salamander, Burke's goldfields, Sonoma sunshine, and Sebastopol meadowfoam. This urban growth continues to threaten occurrences of these listed species. Many of the parcels in the urban growth boundaries are small, have degraded uplands and wetlands, and are fragmented by development.

While it is reasonable to expect that rural land uses will continue into the foreseeable future outside of the urban growth areas, the nature of such use has bearing on habitat quality for the Sonoma County California tiger salamander, Burke's goldfields, Sonoma sunshine, and Sebastopol meadowfoam. While past and ongoing agricultural practices have disturbed seasonal wetlands on the Santa Rosa Plain, certain agricultural practices, such as grazed pasture, have protected habitat from intensive development and are compatible with persistence of these listed species.

A recovered species is one that no longer meets the Act's definition of threatened or endangered due to amelioration of threats. Because the main cause of the decline and the main current threat to all species in this biological opinion is the loss and degradation of habitat in the Santa Rosa Plain, previous conservation efforts including the Santa Rosa Vernal Pool Ecological Reserve System, Santa Rosa Plain Conservation Strategy, Programmatic Biological Opinions, Conservation Banks and Permittee Responsible Mitigation (Preserves), and the Recovery Plan focused upon ameliorating this threat. The Santa Rosa Plain is vital to the recovery of the Sonoma County California tiger salamander, Burke's goldfields, Sonoma sunshine, and Sebastopol meadowfoam where the majority of the CNDDB occurrences are found throughout their range.

The Conservation Strategy (2005) and Programmatic Biological Opinion (Service 2007) identified conservation measures to avoid, minimize, and compensate for adverse effects at project sites and guide the conservation of individuals, seedbank, and habitat. Preserves have been established within Conservation Areas identified in the Conservation Strategy and have contributed to the conservation of contiguous blocks of habitat.

The current understanding of the recovery needs of these species is that recovery is possible only through preserving high-quality habitat that provides essential connectivity, reduces fragmentation, and sufficiently buffers against encroaching development (Service 2016). The Santa Rosa Plain is essential to the survival and recovery of the Sonoma County California tiger salamander, Burke's goldfields, Sebastopol meadowfoam, and Sonoma sunshine because it is where the majority of the current and historic range of each species exists. Conserving these species in the Santa Rosa Plain is necessary to maintain their geographic range to achieve recovery. The Recovery Plan (Service 2016) identifies actions to reduce the threats to these four species and ensure their long-term viability in the wild and allow for their removal from the list of threatened and endangered species.

Recovery Plan goals for these species are to:

1. Restore habitat conditions to sustain viable populations;

2. Maintain the current geographic, elevational, and ecological distribution;

3. Maintain the genetic structure and diversity of existing populations;

4. Protect and manage sufficient habitat to ensure that these species are able to adapt to unforeseen or unknown threats, such as climate change;

5. Re-introduce individuals to successfully establish new populations in historically occupied areas within the current distribution;

6. Minimize the effects of extant or potential threats;

7. Monitor species population trends across multiple years (and varied climatic conditions) to determine whether populations are sustainable; and

8. Manage occurrences on a case-by-case basis, with an emphasis on protections for identified Core Areas.

Sonoma County California tiger salamander

Much of the research on the biology and ecology of the California tiger salamander is from the Central DPS which is the same species as the Sonoma DPS but is separated geographically. Information presented herein is used interchangeably when life history, ecology, and biology may be shared between the Central DPS and Sonoma County DPS.

Description: The California tiger salamander is a large, stocky, terrestrial salamander with a broad, rounded snout. Adults may reach a total length of 8.2 inches (Petranka 1998). Tiger salamanders exhibit sexual dimorphism; males tend to be larger than females. The coloration of the California tiger salamander is white or yellowish markings against black. As adults, California tiger salamanders tend to have the creamy yellow to white spotting on the sides with much less on the dorsal surface of the animal, whereas other tiger salamander species have brighter yellow spotting that is heaviest on the dorsal surface. The larvae have yellowish gray bodies, broad fat heads, large feathery external gills, and broad dorsal fins extending well up their back and range in length from approximately 0.45 to 0.56 inches (1.14 to 1.42 centimeters) (Petranka 1998).

Taxonomy: California tiger salamanders are endemic to the Santa Rosa Plain, the San Joaquin-Sacramento River valleys and bordering foothills, and the coastal valleys of Central California south to Santa Barbara. All California tiger salamanders are federally listed; however, they are listed as three unique entities: the Sonoma County DPS of California tiger salamander, the Santa Barbara DPS of California tiger salamander, and Central DPS of California tiger salamander. In our final listing rule, we determined that the Sonoma population of California tiger salamander is a DPS, as it is geographically isolated and genetically unique from the Santa Barbara and Central DPSs (Service 2003).

Habitat: The Sonoma County California tiger salamander inhabits vernal pools and seasonal ponds, associated grassland, and oak savannah plant communities (Service 2003). Sonoma County California tiger salamanders spend the majority of their lives underground in small mammal burrows in uplands, while ephemeral wetlands play a critical role because they are necessary for breeding.

California tiger salamanders depend on persistent small mammal (e.g., pocket gopher) activity to create, maintain, and sustain sufficient underground refugia (Loredo et al. 1996). These underground burrow systems are critical during the drier months of the year, though juveniles and adults use them throughout the year to grow and survive (Loredo et al. 1996; Pittman 2005; Seymour and Westphal 1994; Shaffer et al. 1993). California tiger salamanders may also use landscape features such as leaf litter or desiccation cracks in the soil for upland refugia. Such underground refugia provide protection from the sun and wind associated with a dry California climate, which can otherwise desiccate (dry out) and kill amphibians in upland terrain.

Because they spend most of their lives underground, California tiger salamanders are rarely encountered, even in areas where they are abundant. Most evidence suggests that California tiger salamanders move, feed, and remain active in their underground dwellings (Trenham 2001;

Semonsen 1998; Van Hattem 2004). Adult California tiger salamanders are rarely seen except during nocturnal breeding migrations, which begin with the first seasonal rains, usually in November or December (Barry and Shaffer 1994).

Although historical breeding habitat for California tiger salamanders is natural vernal pools and ponds, they also use modified ephemeral or permanent ponds and manmade features such as constructed ponds or livestock ponds. This species is not known to breed in streams, rivers, or other flowing aquatic habitats (Cook et al. 2005). However, breeding individuals have been reported in roadside ditches in areas that contain seasonal wetlands. California tiger salamanders are sometimes found within permanent ponds; however these occupied permanent ponds do not typically have predatory fish or breeding bullfrog populations (Fisher and Shaffer 1996). Vernal pools and ephemeral ponds have been observed to better support larger populations than perennial wetlands, indicating that they provide higher-quality breeding habitat (Riley et al. 2003; Wang et al. 2011). Wang et al. (2011) studied Central California tiger salamander populations in both vernal pools and more permanent livestock ponds, and found that salamanders breeding in natural vernal pools had higher reproductive success and overall abundance than those breeding in livestock ponds. The absence of predatory fish species and non-native predators (e.g., bullfrogs) within the breeding pools plays a significant role in the reproductive success, as larvae are vulnerable to the predation (Shaffer et al. 1993). If these predator populations persist in the same habitat, they outcompete and prey upon salamander eggs and larvae. Thus, optimum breeding habitat holds water long enough to allow metamorphosis of salamanders from the larval stage into the air breathing juvenile lifestage (which takes at least three months every year), but not so long as to allow bullfrogs or non-native fish species to breed or survive (Petranka 1998). In Sonoma County, the available data suggest that most extant populations consist of relatively small numbers of breeding adults in the range of a few, to a few dozen pairs and populations that number above 100 breeding individuals are rare (CDFG 2010).

It is not evident whether the origin of the pool matters for habitat selection. Cook et al. (2005) studied Sonoma County California tiger salamander larvae capture rates and occupancy, and found that breeding activity was similar between constructed and natural vernal pools. Cook et al. (2005) did find that the probability of detecting Sonoma County California tiger salamander breeding activity was positively associated with pool depth, as years with higher annual rainfall amounts resulted in higher numbers of larvae. In drought years, ponds may not form at all, and the adults cannot breed (Barry and Shaffer 1994). Typically, breeding pools have moderate to high levels of turbidity. California tiger salamanders rarely use ponds with clear water (Bobzien and DiDonato 2007). The turbidity may help larvae and adults avoid predators.

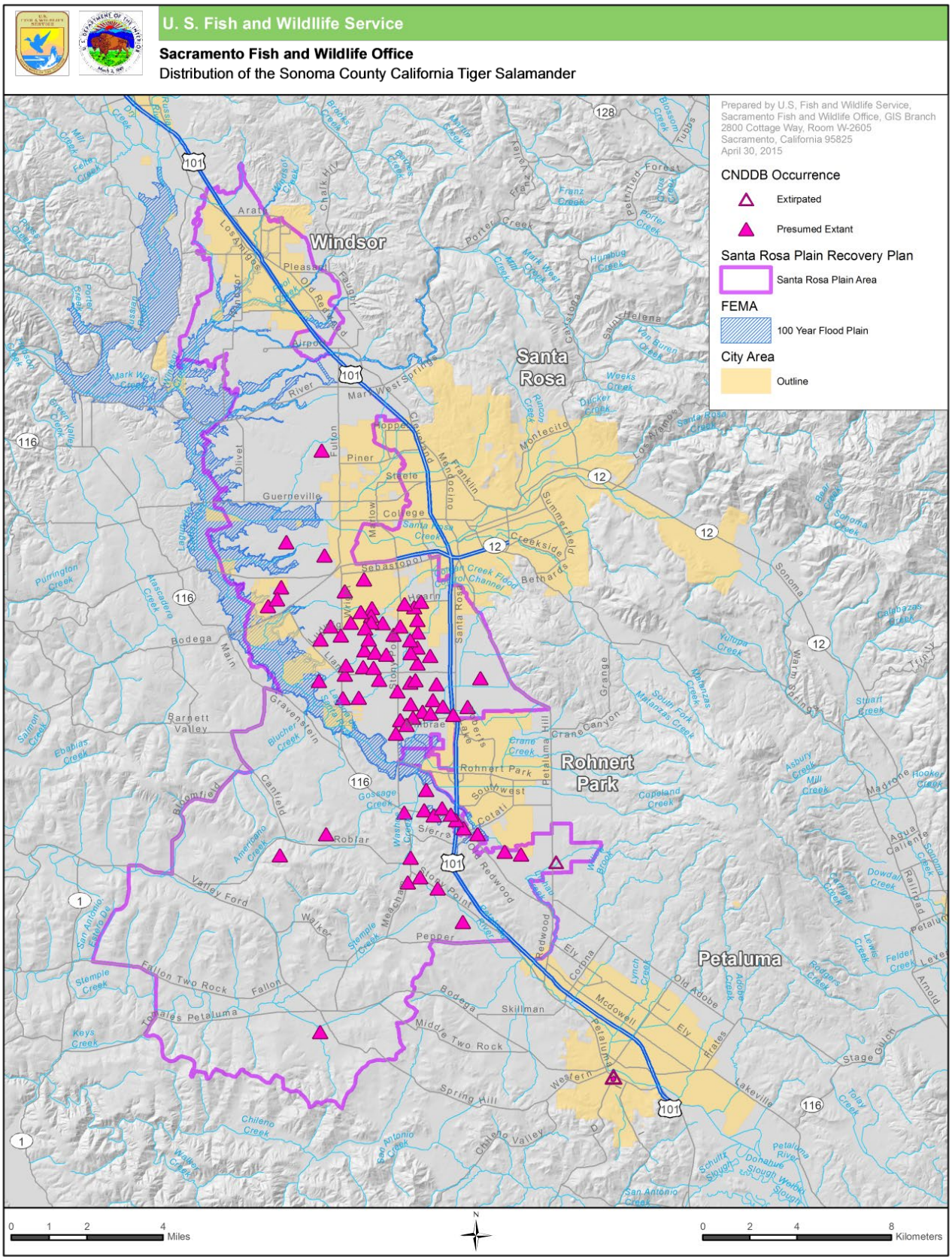
In addition to both upland and aquatic habitat that is essential to the Sonoma County California tiger salamander, maintaining connectivity between these two types of habitat is important for the long-term viability of the Sonoma County California tiger salamander. Connectivity can be maintained when there are large areas of upland habitat that contain multiple breeding wetlands within dispersal distance of each other.

Their home range ideally contains multiple breeding wetlands, which are necessary for the California tiger salamander to persist. If a local population becomes extinct due to unfavorable conditions, having connectivity between ponds is important to ensure that recolonization occurs at individual pond sites (Shaffer et al. 1993).

Distribution: The Sonoma County DPS is widely separated geographically from the closest Central DPS populations, which are located in Contra Costa, Yolo, and Solano counties. The Central DPS is separated from the Sonoma County DPS by the Coast Range, Napa River, and the Carquinez Straits, at a minimum distance of approximately 45 miles. No CNDDB occurrences of the Sonoma County

California tiger salamander exist in the intervening areas (CNDDB 2018). We have no evidence of natural interchange of individuals between the Sonoma County population and other California tiger salamander populations. The distribution is generally between Windsor and Petaluma (Figure 2).

Figure 2: Sonoma California Tiger Salamander Distribution



Within the *Action Area*, there is approximately 36,822 acres of low to high quality habitat (Figure 1) and the current core range of Sonoma County California tiger salamander encompasses approximately 18,000-20,000 acres of fragmented habitat (D. Cook, in literature, 2009). This distribution has been curtailed by urbanization, vineyard conversion, roads, and other development primarily in two areas in recent times: the Santa Rosa Air Center area (southwest Santa Rosa) where observations have decreased since the early 1990s; and in the south Cotati area, where salamanders were once commonly observed in the late 1980s to early 1990s (D. Cook, in literature, 2009).

The Recovery Plan delineated Core Areas and Management Areas. Core areas comprise the heart of the species historical (and current) range and represent central blocks of contiguously occupied habitat that functions to allow for dispersal, genetic interchange between populations, and metapopulation dynamics. Management Areas are occupied habitat peripheral to the species' core range (the Core Areas). However, the extent of the range is unknown due to poor survey coverage in peripheral areas. The delineation of Core Areas and Management Areas was based on known species ranges (based on CNDDB and Adopt Vernal Pool data), projections of potential species' range based on known habitat characteristics within adjacent areas (habitat in need of additional survey), or areas with the necessary conditions for potential restoration opportunities (Service 2016). Delineations have been made by geographic designators such as roads, creeks, or conservation area boundaries from the Strategy (Service 2016).

Threats: Threats to the Sonoma County California tiger salamander discussed in detail in the Recovery Plan are numerous and include the following (Service 2016):

1. Habitat Destruction and Loss
2. Habitat Alteration
3. Climate Change
4. Disease
5. Predation
6. Mortality from Road Crossings
7. Contaminants
8. Mosquito Control (Abatement)
9. Hybridization with Non-native Tiger Salamanders
10. Small Population Size

At the time of listing, we determined that the primary cause for the decline of the Sonoma County California tiger salamander was loss, degradation, and fragmentation of habitat as the result of urbanization (Service 2003). We still consider habitat loss and fragmentation to be the primary threat to the Sonoma County California tiger salamander (Service 2016).

Habitat Loss: It is estimated that, by 1990, 25 percent of the 28,000-acre range of the Sonoma County California tiger salamander within the Santa Rosa Plain had been converted to subdivisions, ranchettes, golf courses, and commercial buildings, while an additional 17 percent of this area had been converted to agricultural uses (Waaland *et al.* 1990). At the time of listing, five known breeding

sites had been destroyed in the previous 2 years (Service 2003). There were eight known remaining breeding sites distributed in the City of Santa Rosa and immediate associated unincorporated areas, an area approximately 8 km (5 mi) long by 6 km (4 mi) wide. At listing, we determined that all eight of these breeding sites were threatened by urbanization (Service 2003). A few new breeding sites have been discovered at the north end of Duer Road, within the Horn-Hunter Management Area of the Recovery Plan and southwest of Cotati within parts of the Americano Creek and Steple Creek watersheds (Service 2016). However, the latter is not included as part of the *Action Area*. An undetermined amount of land use conversions and intensive and routine agricultural practices are not reviewed for environmental compliance under the federal permitting process. It is expected that some new intensive agriculture including vineyard, row crops, cannabis grows, recycled water spray irrigation, and their infrastructure will occur within the Action Area.

Preserves: Since the Sonoma County California tiger salamander was listed, several Preserves have been established to offer credits or serve as compensation for the destruction or degradation of habitat. All are protected by conservation easements or owned by CDFW and have funding mechanisms for the perpetual management of the habitat. A summary of the majority of the sites is provided in the Recovery Plan (Service 2016).

Burke's Goldfields, Sebastopol Meadowfoam and Sonoma Sunshine

Threats: Threats to Burke's goldfields, Sonoma sunshine and Sebastopol meadowfoam discussed in detail in the Recovery Plan are numerous and include the following (Service 2016):

1. Urban development.

2. Conversion of habitat to incompatible agricultural uses.

3. Alteration of hydrology.

4. Encroachment of non-native plants.

5. Incompatible grazing levels and build-up of thatch.

6. Over-collection of seed and inoculum (soil containing seeds, plant parts, etc.) from extant locations for the purpose establishing additional new populations of the listed plants in Preserves.

7. Loss of genetic diversity and mixing from disrupted gene flow from habitat fragmentation and from inter-mixing gene pools as a result of moving seeds around the Santa Rosa Plain (Sloop *et al.* 2012b).

8. Reduction or loss of species-specific pollinators which could result in reduced seed production (Sloop *et al.* 2012b).

9. Increased potential for random or unpredictable extirpations of occurrences as a result of their isolation and already small size (Gilpin and Soule 1986, Patterson *et al.* 1994, CNDDB 2018).

10. Climate change that may result in overall warmer temperatures with greater unpredictability in rainfall (Field *et al.* 1999, Cayan *et al.* 2005, IPCC 2013).

Management: Cattle grazing may be an effective tool for maintaining species diversity and managing non-native plants (Hayes and Holl, 2003, Skaer *et al.*, 2013). Many native seasonal wetland plants are small and require an open environment to successfully germinate and reproduce; they compete for soil moisture and light resources with non-native grasses (Marty 2005). Cattle selectively forage on grasses which results in a more open canopy (Weiss 1999). However, since the time of listing, livestock grazing has been removed at many locations and cessation of cattle grazing has been found to exacerbate the negative effects of invasive nonnative plants on vernal pool inundation period. Where grazing has been removed, areas of bare soil can be quickly occupied by nonnative, invasive plants and develop layers of grass thatch that displace and inhibit germination of many vernal pool annual plants (Marty 2005). The CDFW is re-establishing appropriate grazing practices on some CDFW - owned Preserves to reduce thatch build-up and nonnative competitors to the three listed plants (e.g., Todd Road Unit Ecological Preserve).

Preserves: Since Burke's goldfields, Sebastopol meadowfoam, and Sonoma sunshine were listed, several Preserves have been established to offer credits or serve as compensation for the destruction or degradation of habitat. All are protected by conservation easements or owned by CDFW and have funding mechanisms for the perpetual management of the habitat. A summary of the majority of the sites is provided in the Recovery Plan (Service 2016).

Burke's Goldfields

Description: Burke's goldfields is an annual herb that is typically less than 30 cm (11.8 in) tall (Ornduff 1993). It has hairy stems, which may be simple or branched. The narrow, opposite leaves are no more than 8 cm (3.1 in) long and may be lobed or not. From April to June, the end of each branch bears one daisy-like flower head approximately 1.5 cm (0.6 in) across. The fruits are achenes (dry, one-seeded fruits) less than 1.5 mm (0.06 in) in length. The fruits of Burke's goldfields can be distinguished from those of other goldfields by the presence of one long awn (bristle and numerous short scales) (Ornduff 1993). Individual Burke's goldfields plants may exhibit some geographic variation in morphology (McCarten 1985, Patterson *et al.* 1994).

Taxonomy: Ornduff (1966) published a comprehensive study of the genus *Lasthenia*, Burke's goldfields was then recognized as a distinct species and the name *Lasthenia burkei* was accepted widely. Continuing research indicated that Burke's goldfields, Fremont's goldfields, and Contra Costa goldfields (*Lasthenia conjugens*) form a closely related species group (Ornduff 1969*b*, Crawford and Ornduff 1989). However, Burke's goldfields was found to be genetically distinct from Fremont's and Contra Costa goldfields (Crawford and Ornduff 1989). *Lasthenia burkei* and its relatives are members of the aster family (Asteraceae).

Habitat: Burke's goldfields grows in vernal pools and wet meadows generally below 500 m (984 ft) (Chan and Ornduff 2012). In Sonoma County, the vernal pools containing Burke's goldfields are on nearly level to slightly sloping loams, clay loams, and clays. A clay layer or hardpan approximately 0.6 to 0.9 m (2 to 3 ft) below the surface restricts downward movement of water (Service 1991). Huichica loam is the predominant soil series on which Burke's goldfields is found on the northern part of the Plain (Patterson *et al.* 1994). Huichica loam is a fine textured clay loam over buried dense clay and cemented layers (Patterson *et al.* 1994). More southerly Burke's goldfields sites likely occur on Wright loam or Clear Lake clay (Patterson *et al.* 1994). Wright loam is a fine silty loam over buried dense clay and marine sediments. Clear Lake clay is hard dense clay from the surface to many feet thick (Patterson *et al.* 1994).

The primary habitats of Burke's goldfields are shallow vernal pools and wet swales within valley grassland and oak woodland habitats (CNDDB 2018). On the Plain, Burke's goldfields grows in the

bottoms of pools ranging from less than 25 cm (10 in) in depth to 50 cm (20 in) (Patterson 1990, Patterson *et al.* 1994, Patterson *in litt.* 2000). Burke's goldfields grows in naturally-occurring pools that range in surface area from approximately 2 square m (21.5 square ft) to 0.3 ha (0.75 ac (Patterson *in litt.* 2000). Most of the vernal pools where Burke's goldfields grows are loosely classified as northern vernal pools (Keeler-Wolf *et al.* 1998), but the Manning Flat occurrence in Lake County is in a northern volcanic ash flow vernal pool (Sawyer and Keeler-Wolf 1995). Burke's goldfields also has been observed occasionally in artificially-created depressions such as drainage ditches and in disturbed sites such as orchards and disked fields (Patterson 1990, Patterson *et al.* 1994) that formerly supported vernal pools.

Burke's goldfields grows at a wide range of elevations, which vary by region. The lowest-elevation occurrences are found between 27 and 46 m (90 to 150 ft.) on the Plain, and in the Alexander Valley, where it occurs at 52 m (170 ft.). The Ukiah occurrence is intermediate in elevation at 188 m (620 ft.). The Lake County occurrences are at the highest elevations, with one at 427 m (1,400 ft.) and the Manning Flat occurrence at 579 m (1,900 ft.) (CNDDB 2018).

Reproduction and Ecology: Burke's goldfields is an annual. Burke's goldfields typically germinates in autumn following heavy rains, although late initiation of rains may delay seedling emergence (Ornduff 1969b). Plants that establish in autumn under natural conditions may tolerate prolonged submergence, but do not begin rapid stem growth until vernal pools and swales dry down during late winter or early spring (Ornduff 1969b, Patterson et al. 1994). Flowering occurs any time between late-March and mid-June, although the typical flowering period is from mid-April to mid-May (Greene 1886, Ornduff 1966, Ornduff 1977b, Patterson et al. 1994); early dry and warm conditions favor early flowering. Seed set, maturation, and dispersal may occur from late-April to June, and may be prolonged by late rains or cool temperatures. Plants usually become senescent by early summer unless late-spring rains prolong reproduction (Patterson et al. 1994). Seed dispersal mechanisms are not known. Pappus awns (needle-like appendages attached to the achene) may assist in windborne seed dispersal. Other seed dispersal mechanisms may include water or wildlife.

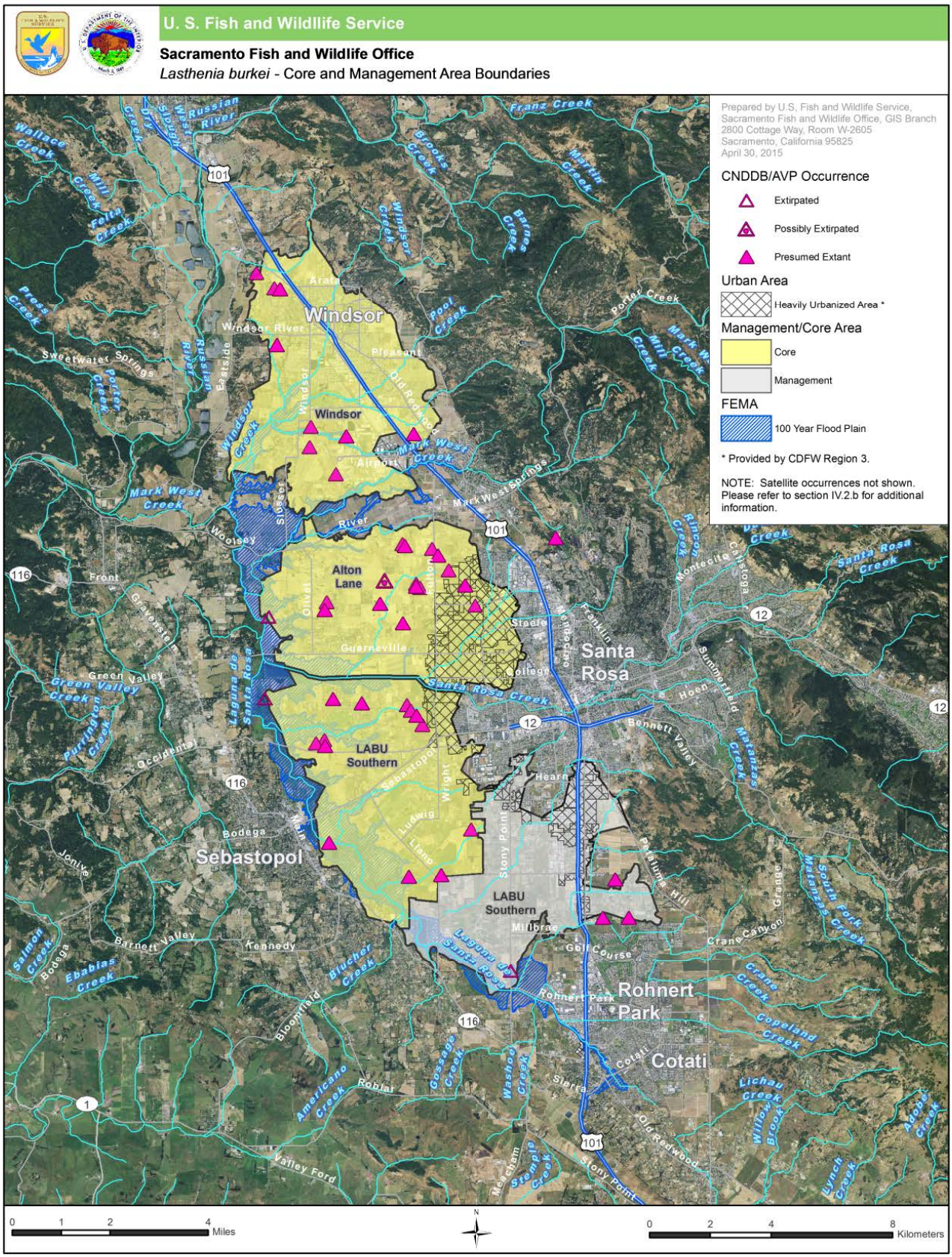
The flowers of Burke's goldfields are predominantly pollinated by outcrossing but they are capable of self-pollination (Sloop et al. 2012c). They are thought to be insect pollinated rather than wind-pollinated. Insects known to visit the flowers of the genus *Lasthenia* include butterflies, beetles, flies, true bugs, bees, and wasps (Thorp and Leong 1998). Most of these insects are generalist pollinators. All of the specialist pollinators of *Lasthenia* spp. are solitary bees (Thorp and Leong 1998). Gilmore, Sloop and Rank (2012) conducted a pollinator study of Burke's goldfields and found that although the solitary bee (*Andrena submoesta*) specializes on Burke's goldfields and is apparently dependent on it as a food source, the plant may not rely on *A. submoesta* for pollination (Gilmore et al. 2012). The Bombyliid fly (also called a bee fly), *Conophorus cristatus*, was found to be the dominant visitor of Burke's goldfields and may be its primary pollinator. Bee flies lay eggs near ground-nesting bees. Bee fly larvae are, depending on species, parasites of larvae of solitary bees and wasps, beetles, moths, grasshoppers, and other flies (Black et al. 2009). Syrphid flies (members of several genera in the family Syrphidae (hover flies) were also found to be an important part of the pollinator community for Burke's goldfields (Gilmore et al. 2012). Syrphid fly primary habitats are those with flowering plants, leaf litter, and soil within grasslands, rangelands, and meadows with limited tilling. Specifically, adult primary habitat are places with flowering plants. Overwintering larvae, pupae, and adults are found in leaf litter and soil and the larvae are generalist predators that feed on aphids (Hopwood et. al 2016). A variety of habitats including uplands, grasslands, and wetlands in the Santa Rosa Plain that support a diverse pollinator population and other flowering species for pollinators to visit are necessary for Burke's goldfields long term persistence.

Both the ray and disk flowers of all goldfields species produce achenes, increasing the potential for seed production per head. However, the reproductive output of individual plants is highly variable, depending on plant density and vigor, and probably on pollinator behavior as well. Each flower head can produce as many as 35 achenes, and the number of flower heads per plant can range from 1 to more than 20 (Patterson et al. 1994). Annual survival rates and other demographic parameters have not been investigated.

Burke's goldfields has also likely adapted to "risky environments" by producing a persistent seed bank. Some occurrences have reappeared after no plants were evident for 2 years, suggesting that viable seeds remained in the soil during that period (Patterson 1990).

Distribution: The core of the current range of Burke's goldfields is in the *Action Area* north of the community of Windsor to east of the city of Sebastopol with three occurrences south of Highway 12. The most current information from CNDDB, from survey data collected by the Adopt-a-Vernal Pool program, and from species experts is shown on Figure 3.

Figure 3: Burke's Goldfields Distribution



Most occurrences have been subjected to substantial loss or alteration of habitat (Service 2016) and are much smaller in area and numbers of plants than in the past (CNDDB 2018). Burke's goldfields occurrences continue to become increasingly fragmented in the area of the Town of Windsor and are now nearly extirpated from that area (P. Chamberlin pers. comm. 2008). It is unknown to what extent occurrences have been lost entirely due to development or other human-caused ground-disturbing activities because they were lost prior to being documented.

Occurrence sizes for Burke's goldfields and other vernal pool annuals are difficult to document by numbers of plants because they fluctuate greatly from year to year. The particular conditions that contribute to large occurrences in certain years are not well understood. Most Burke's goldfields occurrences contain a few hundreds or thousands of plants (CNDDB 2018). The largest known occurrences are at the Alton Lane Vernal Pool Preserve (Occurrence 25), with approximately 1.4 million plants in 2013; at the Wright Preservation Bank (Occurrence 28) where the occurrence has ranged from approximately 5.3 million to 1 million over the past 5 years; Slippery Rock Conservation Bank (Occurrence 28), where the occurrence has ranged from 15,059 in 2007 to over 3.1 million in 2015, and the occurrence east of Fulton Road near Piner Road (Occurrence 19), where the occurrence has ranged between 350 plants in 1998 to 18.5 million plants in 2009; 24,860 were found at this site in 2012 (CNDDB 2018).

Burke's goldfields growing at Alton Lane, Alton North Conservation Bank, Hale Mitigation Bank, Horn Mitigation Bank Phases 2 and 3, Slippery Rock Conservation Bank, Proposed Windmill mitigation site (former proposed Horn Mitigation Bank Phase 5), Woodbridge Preserve, and Wright Preservation Bank are introduced from other sites on the Santa Rosa Plain into restored vernal pool habitat. These efforts have increased the distribution in the Santa Rosa Plain or perhaps re-established the plants in those locations. A study is underway to gather genetic information and perform controlled transplant experiments to provide information to inform future decisions about seed translocation that will both preserve remaining genetic variation within Burke's goldfields while maximizing the success of populations that are introduced into created habitat (Emery 2016)

Sebastopol Meadowfoam

Description: Sebastopol meadowfoam is an annual herb of the false meadowfoam family(Limnanthaceae) with weak, somewhat fleshy, decumbent stems up to 30 cm (11.8 in) long (stems grow longest when the plant is submerged while actively growing). The seedlings are unusual among Limnanthes species in that they have entire leaves. Leaves of mature plants are up to 10 cm (3.9 in) long and have 3 to 5 leaflets that are narrow and unlobed with rounded tips. Although the first leaves are narrow and undivided, leaves on the mature plant have three to five undivided leaflets along each side of a long stalk (petiole). The length of the petiole also appears to be promoted by submergence. The shape of the leaves distinguishes Sebastopol meadowfoam from other members of the Limnanthes genus by having entire leaves as opposed to lobed leaves.

Sebastopol meadowfoam has fragrant, white flowers during April and May. The flowers are borne in the leaf axils (upper angle between leaf and stem), are bell- or dish shaped, with petals 12 to 18 mm (0.47 to 0.71 in) long. The sepals (green outermost whorl of flower parts that enclose the bud) are shorter than the petals, which turn outward as the nutlets (small, dry nuts) mature. The nutlets are dark brown, 3 to 4 mm (0.12 to 0.16 in) long, and covered with knobby pinkish tubercles (small wartlike projections) (Ornduff 1969a, Brown and Jain 1977, Hauptli et al. 1978, Wainwright 1984, Patterson et al. 1994, Ornduff and Morin 2012). The seeds of Sebastopol meadowfoam germinate after the first significant rains in fall. Repeated drying and filling of pools in the spring favors development of large plants with many branches and long stems.

Taxonomy: The earliest collection of Sebastopol meadowfoam was made in 1946 "between Bodega and Petaluma, south of Sebastopol" but this record most likely represents a site near Sebastopol (Wainwright 1984). The species was described in 1969 by Ornduff (1969a). The type locality for Sebastopol meadowfoam is Todd Road, just west of the intersection with Llano Road, which is near Sebastopol in Sonoma County (Ornduff 1969a).

Habitat: Sebastopol meadowfoam grows in northern basalt flow and northern hardpan vernal pools(Sawyer and Keeler-Wolf 1995), wet swales and meadows, on the banks of streams, and in artificial habitats such as ditches (Wainwright 1984; CNDDB 2018). Sebastopol meadowfoam grows in both shallow and deep areas, but is most frequent in pools 25 to 51 cm (10 to 20 in) deep (Patterson et al. 1994). The species is most abundant in the margin habitat at the edge of vernal pools or swales (Pavlik et al. 2000, 2001). Most confirmed occurrences of Sebastopol meadowfoam on the Santa Rosa Plain grow on Wright loam or Clear Lake clay soils (Patterson et al. 1994, CNDDB 20018). A few occurrences are on other soil types, including Pajaro clay loam, Cotati fine sandy loam, Haire clay loam (Patterson et al. 1994) and Blucher fine sandy loam (Wainwright 1984).

The surrounding plant communities range from oak savanna, grassland, and marsh in Sonoma County to riparian woodland in Napa County (CNDDB 2018). Sebastopol meadowfoam occurs at elevations of 15 to 41 m (50 to 135 ft) throughout most of its range, including Napa County. The Knights Valley occurrence, in Sonoma County, was at 116 m (380 ft) (CNDDB 2018).

Reproduction and Ecology: According to Patterson *et al.* (1994), the seeds of Sebastopol meadowfoam germinate after the first significant rains in fall, although late initiation of rains may delay seed germination. Sebastopol meadowfoam plants grow slowly underwater during the winter, and growth rates increase as the pools dry. Repeated drying and filling of pools in the spring favors development of large plants with many branches and long stems. Sebastopol meadowfoam begins flowering as the pools dry, typically in March or April. The largest plants can produce 20 or more flowers. Flowering may continue as late as mid-June, although in most years the plants have set seed and died back by then. Each plant can produce up to 100 nutlets.

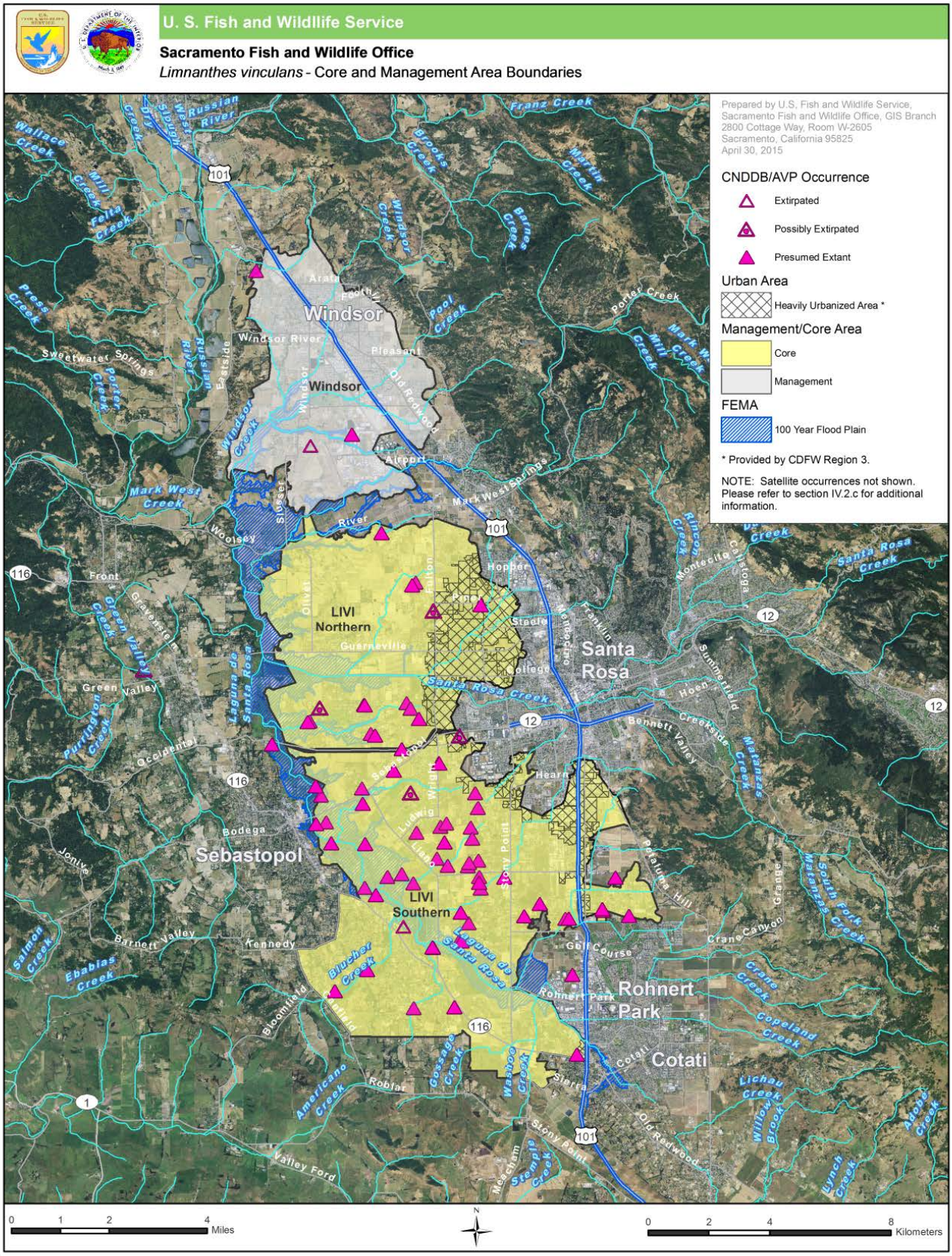
Nutlets of Sebastopol meadowfoam likely remain dormant in the soil, as has been noted in other species of *Limnanthes* (Patterson et al. 1994). For example, in the late 1980s and early 1990s, a site in Cotati remote from other Sebastopol meadowfoam occurrences was surveyed for several years by independent qualified botanists. None of these botanists identified flowering occurrences of Sebastopol meadowfoam on the project site. Conditions of the pools on the site were highly degraded by wallowing hogs (*Sus scrofa*) and subsequent eutrophication (over enrichment by nutrients) of the pools. Following several years of negative surveys, 12 plants of Sebastopol meadowfoam emerged simultaneously in one pool in the first year following removal of hogs.

A study by Gilmore et al. (2012) found that Sebastopol meadowfoam was visited most frequently by Bombyliid flies in the genus *Conophorus*. Bee flies lay eggs near ground-nesting bees. Bee fly larvae are, depending on species, parasites of larvae of solitary bees and wasps, beetles, moths, grasshoppers, and other flies (Black et al. 2009). Two species of Limnanthes specialist bees, *Panurginus occidentalis* and *Andrena pulverea* (*A. limnanthis* in older literature), pollinate Sebastopol meadowfoam. *Andrena pulverea* survives drought years, when few meadowfoams reach flowering, by remaining inactive for 2 years or more (Thorp 1990). A variety of habitats including uplands, grasslands, and wetlands in the Santa Rosa Plain that support a diverse pollinator population and other flowering species for pollinators to visit are necessary for Sebastopol meadowfoam long term persistence.

Jain (1984) determined that the rate at which Sebastopol meadowfoam flowers were fertilized by pollen from other Sebastopol meadowfoam flowers rather than self-pollination (outcrossing rate) was 10 to 50 percent. Mechanisms for dispersal of nutlets in this species have not been studied. Likely dispersal agents include water (Wainwright 1984), birds, and livestock (Jain 1978). Jain (1978) studied dispersal of nutlets similar to those of Sebastopol meadowfoam in two species of meadowfoam, *L. bakeri* (Baker's meadowfoam) and *L. striata* (striped meadowfoam). Nutlets of *L. bakeri* did not disperse beyond the point where they were placed. Nutlets of *L. striata* moved a short distance within the same pool where they were placed but did not disperse to other pools (Hauptli *et al.* 1978, Jain 1978).

Distribution: The current status of numerous Sebastopol meadowfoam occurrences is unknown; however, the most current information for this species in the Recovery Plan (Service 2016) indicates that there are 33 occurrences of Sebastopol meadowfoam that are presumed extant on the Santa Rosa Plain of which at least 3 have been introduced and 5 occurrences that are extirpated or possibly extirpated (Figure 4).

Figure 4: Sebastopol Meadowfoam Distribution



Although many occurrences have been surveyed in recent years, several others have not been visited in over 20 years in part due to lack of access to the sites. Occurrences are distributed throughout the Santa Rosa Plain, but most are south of Santa Rosa Creek. As with the two other listed plants species, occurrences of Sebastopol meadowfoam can vary greatly in area and numbers of plants from year to year. In summary, Sebastopol meadowfoam inhabits the *Action Area* based on the recent observations, the biology and ecology of the species, and the presence of suitable habitat.

Sonoma Sunshine

Description: Sonoma sunshine plants are less than 30 centimeters (cm) (11.8 inches (in)) tall with alternate, linear leaves (Ornduff 1977*a*, Baldwin 2012). The leaves have smooth margins and are 5.1 to 15.2 cm (2.0 to 6.0 in) long with zero to five lobes (Baldwin 2012).

From March to May, the plants have a butter-yellow, daisy-like flower head at the tip of each branch. Each flower head is less than 1.5 cm (0.6 in) across. The 6 to 15 outer petals are 5 to 7 millimeters (mm) (0.20 to 0.28 in) long. Occasionally the flowers may be white instead of yellow. The pollen is white.

The flowers produce tapered achenes (dry, one-seeded fruits) that are 3 to 4 mm (0.12 to 0.16 in) long and have 4 to 6 sharp angles along the sides. The achenes are covered with tiny bumps and become slimy when wet giving the species one of its common names, "Baker's sticky seed" (Ornduff 1963, Munz and Keck 1968, Ornduff 1977*a*, Baldwin 2012).

Taxonomy: Sonoma sunshine is an annual plant in the aster family. It has been known by the scientific name Sonoma sunshine (Heiser) since it was first described by Heiser (1947). Two other species are recognized in the genus Blennosperma; *B. nanum* (dwarf blennosperma) grows in California and *B. chilense* (Chilean blennosperma) occurs in Chile (Baldwin 2012).

Habitat: Sonoma sunshine grows in vernal pools, the grassy margins of swales (shallow channels that connect vernal pools), and seasonally wet grasslands at elevations ranging from 21 to 43 m (70 to 140 ft) on the Santa Rosa Plain (Baldwin 2012, CNDDB 2018). The vernal pools supporting Sonoma sunshine are of two types: northern hardpan (Sawyer and Keeler-Wolf 1995) and an unclassified type loosely referred to as northern vernal pools (Keeler-Wolf et al. 1998). On the Santa Rosa Plain, vernal pools and swales are found within valley oak woodlands and north coastal prairie grasslands (CH2M Hill 1995). Sonoma sunshine typically grows in shallow vernal pools, 30 to 50 cm (12 to 20 in) deep, and in swales (Patterson 1991, Patterson et al. 1994, CNDDB 2018). It may occur in swale bottoms, but more commonly grows near the upper edges (margins) or high-water lines of vernal pools. This pattern could be due to competition or dispersal patterns. This species typically is more abundant in portions of vernal pools and swales which lack dense cover of nonnative plants, matted leaf litter, or algal mats.

Throughout its range, Sonoma sunshine occurs in vernal pools on nearly level to slightly sloping loams, clay loams, and clays. A clay or hardpan layer typically occurs 0.6 to 0.9 m (2 to 3 ft) below the surface and restricts downward movement of water (Service 1991). The two disjunct groupings of Sonoma sunshine occurrences on the Santa Rosa Plain occur on different soil types (Patterson et al. 1994). Sonoma sunshine primarily grows on Huichica loam north of Highway 12 and on Wright loam and Clear Lake clay south of Highway 12 (Patterson et al. 1994). Huichica loam is a fine-textured clay loam over buried, dense clay and cemented layers. Wright loam is a fine silty loam over buried, dense clay and marine sediments. Clear Lake clay is hard, dense clay extending downwards from the surface (Patterson et al. 1994).

Reproduction and Ecology: Sonoma sunshine is an annual; its entire life cycle from seed germination to seed set is completed in a single growing season. In nature, Sonoma sunshine seeds germinate in the fall following heavy rains, and the plants can grow even when submerged (Patterson *et al.* 1994). The specific conditions that trigger seed germination in nature are not known, but Sonoma sunshine seeds can germinate in as little as 3 days after wetting in the greenhouse. Seeds that were collected on the Santa Rosa Plain in 1989 and 1990, and maintained in cold storage, germinated readily when they were covered with a thin layer of soil and moistened (Mistretta *in litt.* 1991). A large percentage of seed (78 percent to 98 percent) germinated in such tests. This species usually blooms before other vernal pool plants such as *Limnanthes* spp. (meadowfoam), *Downingia* spp. (downingia), and *Lasthenia* spp. (goldfields) (Thorp and Leong 1998).

Sonoma sunshine typically flowers in March and April (Munz and Keck 1968, Ornduff 1977*a*) but has been observed in flower as early as December (Ashley and Waaland 1990) and as late as mid-May (Patterson *et al.* 1994). The achenes probably mature by early summer (May and June) as adult plants die, as is true for the closely related dwarf blennosperma (*B. nanum*) (Ornduff 1963). Dispersal mechanisms for the achenes have not been studied.

Like many other plants native to vernal wetlands, Sonoma sunshine likely forms a persistent soil seed bank. Small populations of Sonoma sunshine (those with fewer than 500 adult plants) are likely to remain dormant in the seed bank, and therefore undetected, during years of unfavorable conditions. For example, an occurrence located 5 miles south of El Verano in Sonoma Valley was considered to be extirpated in 2008; however, plants were observed at the site in 2011 and the occurrence is now considered extant (CNDDB 2018). Therefore, caution should be used before declaring that an occurrence of this species has been extirpated. The longevity of dormant Sonoma sunshine seeds is not known. In a seedbank study of Sonoma sunshine and Sebastopol meadowfoam by Sloop and Brown (2012a), Sonoma sunshine seed was found from the soil surface to a depth of 7.6 cm (3 in).

A pollinator study by Gilmore *et al.* (2012) showed that Sonoma sunshine has a diverse pollinator community due to the higher number of generalist native bees visiting the plants. A diverse pollinator community benefits a plant species by reducing the risk of insufficient pollination and seed set as a result of pollinator loss (Gilmore *in litt.*, 2014). The most abundant native pollinator of Sonoma sunshine was the solitary bee, *Andrena blennospermatis*. Solitary bees are mostly native bees that do not form colonies. Each female bee constructs its own nest most commonly in tunnels in the ground. Other pollinators that visited Sonoma sunshine included *Apis mellifera* (European honeybee), four species of generalist native bees, and syrphid flies. In the vernal pools that supported Sonoma sunshine, solitary bees were more abundant in natural vernal pools than in created pools (Gilmore *et al.* 2012). Syrphid flies (members of several genera in the family Syrphidae (hover flies) were also found to be an important part of the pollinator community for Sonoma sunshine (Gilmore et al. 2012). Syrphid fly primary habitats are those with flowering plants, leaf litter, and soil within grasslands, rangelands, and meadows with limited tilling. Specifically, adult primary habitat are places with flowering plants. Overwintering larvae, pupae, and adults are found in leaf litter and soil and the larvae are generalist predators that feed on aphids (Hopwood et. al 2016). A variety of habitats including uplands, grasslands, and wetlands in the Santa Rosa Plain that support a diverse pollinator population and other flowering species for pollinators to visit are necessary for Sonoma sunshine long term persistence.

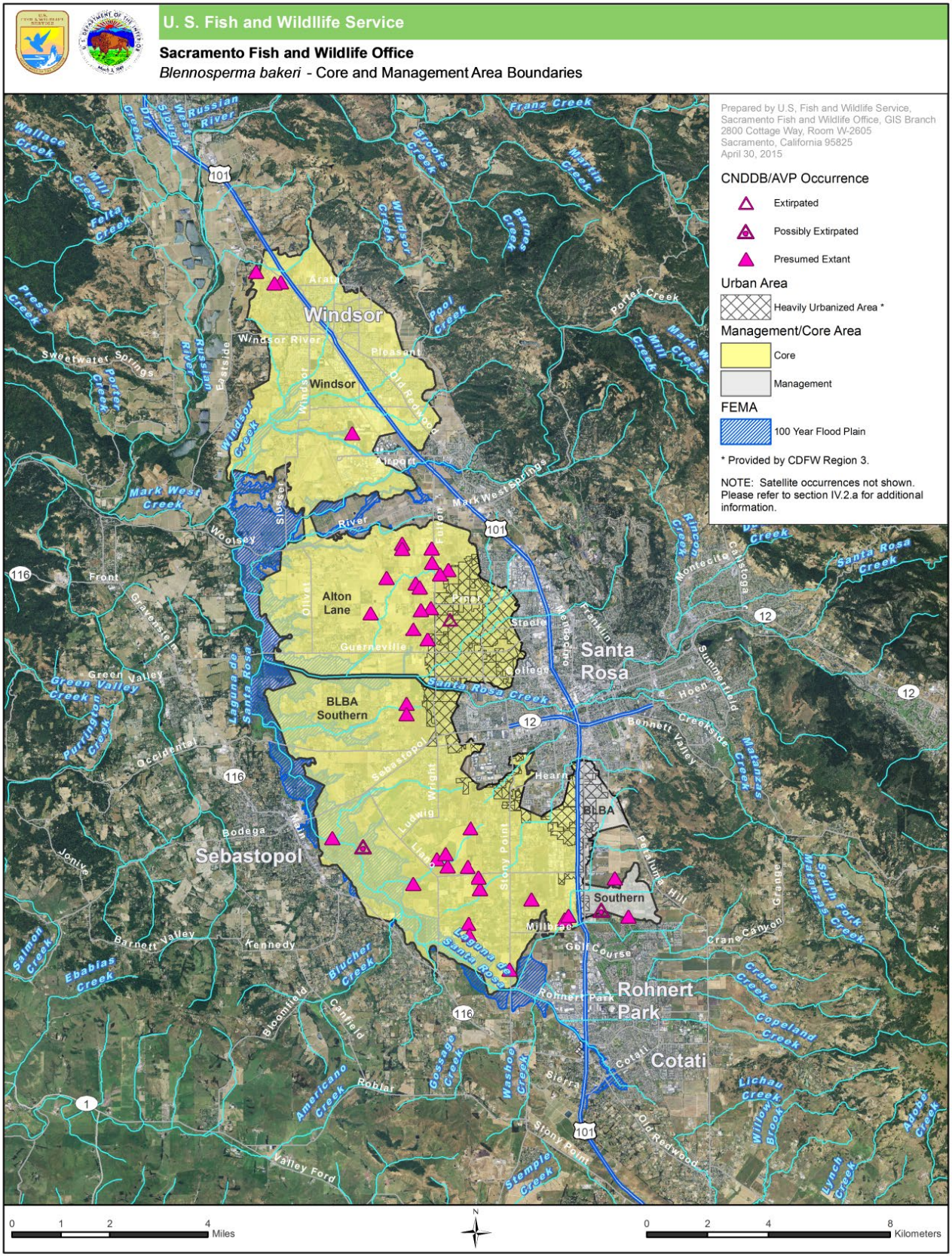
Only certain aspects of the demography of Sonoma sunshine have been studied. The total number of achenes produced per plant varies because the number of flower heads is not consistent. Under dry conditions, or in dense populations, Sonoma sunshine may bear only a single flower head per plant (Patterson *et al.* 1994), thus producing a maximum of 15 achenes. However, when pools dry

and fill repeatedly in a single growing season, each plant may produce as many as 20 flower heads (Patterson *et al.* 1994), with potential for 300 achenes per plant. Seed dispersal mechanisms are not known.

As an annual species, it is expected that Sonoma sunshine will respond to stochastic environmental events, such as changes in vegetative composition, climate, and disturbance, by partial germination of its seed bank. Baskin and Baskin (1998) indicate that species that are adapted to "risky environments" produce persistent seed banks to offset years of low reproductive success and to ensure the species can persist at a site without immigration. Considering the adaptations of these plants to a variable Mediterranean climate, it is likely that the seed of Sonoma sunshine can persist in the seed bank for an undetermined number of years. Although formal studies of seed viability have not been conducted for this species, it is reasonable to expect its seed bank may persist for extended periods without germination until conditions are favorable to allow germination. Seeds of this species have been stored artificially for up to 6 years with little loss of viability, but those stored for 10 or more years have not germinated (Patterson *in litt.* 2000). The maximum duration of viable seed in the soil is not known, however, smaller seeds, such as those produced by Sonoma sunshine, tend to withstand longer periods of dormancy than larger seeds (Service 2016).

Distribution: Sonoma sunshine occurs only in Sonoma County with the majority on the Santa Rosa Plain. In the Santa Rosa Plain, the species ranges from near the community of Windsor in the north to Rohnert Park in the south. Sonoma sunshine has been introduced to at least 12 sites during mitigation activities or to establish conservation banks within the historical range of the species. The most current occurrence information for this species in the Recovery Plan (Service 2016) indicates the presence of 18 extant occurrences and five extirpated or possibly extirpated occurrences (Figure 5).

Figure 5: Sonoma Sunshine



Some occurrences have been fragmented into multiple locations. Populations exhibit extreme fluctuations in size among years, often varying by one or two orders of magnitude (CNDDB 2018). Individual occurrence sizes ranged over time from fewer than 100 plants to more than 1.5 million plants (CNDDB 2018). Collection of annual abundance data has been sporadic; therefore, determination of population trends is difficult.

Status and Environmental Baseline of Sonoma California Tiger Salamander Critical Habitat

The Service published a notice in the Federal Register to propose critical habitat for the Sonoma County California tiger salamander DPS (Service 2009). On August 31, 2011, approximately 47,383 acres were designated as critical habitat (Service 2011). Approximately 252 acres of Graton Rancheria trust lands were excluded based on the benefits of a finalized management plan that provides for the long-term protection of Sonoma California tiger salamander habitat. Approximately 42,041 acres of designated critical habitat are within the *Action Area* (Figure 1).

Critical habitat is defined in Section 3 of the Act as: (1) The specific areas within the geographical area occupied by a species, at the time it is listed in accordance with the Act, on which are found those physical or biological features (a) essential to the conservation of the species and (b) that may require special management considerations or protection and; (2) specific areas outside the geographical area occupied by a species at the time it is listed, upon a determination that such areas are essential for the conservation of the species. In determining which areas to designate as critical habitat, the Service considers those physical and biological features that are essential to a species' conservation and that may require special management considerations or protection (50 CFR 424.l2(b). The Service is required to list the known PCEs together with the critical habitat description. Such physical and biological features include, but are not limited to, the following:(1) space for individual and population growth, and for normal behavior; (2) food, water, air, light, minerals, or other nutritional or physiological requirements; (3) cover or shelter; (4) sites for breeding, reproduction, rearing of offspring, or dispersal and; (5) generally, habitats that are protected from disturbance or are representative of the historic geographical and ecological distributions of a species.

Based on the above needs and our current knowledge of the life history, biology, and ecology of the species, and the habitat requirements for sustaining the essential life-history functions of the species, the Service determined that the following PCEs are essential to the conservation of the Sonoma County California tiger salamander:

- PCE 1: standing bodies of fresh water (including natural and manmade (e.g., stock) ponds, vernal pools and other ephemeral or permanent water bodies that typically support inundation during winter/early spring and hold water for a minimum of 12 consecutive weeks in a year of average rainfall);

- PCE 2: upland habitats adjacent and accessible to and from breeding ponds that contain small mammal burrows or other underground refugia that Sonoma County California tiger salamanders depend upon for food, shelter, and protection from the elements and predation; and

- PCE 3: accessible upland dispersal habitat between occupied locations that allow for movement between such sites.

A single unit was designated as critical habitat for the Sonoma County California tiger salamander (Service 2011). The Santa Rosa Plains Unit is located in Central Sonoma County and contains approximately 47,383 acres, which includes 745 acres of state lands, 744 acres of city lands, 498 acres of county lands, 9 acres of individually owned tribal trust land, and 45,387 acres of private lands. No federal lands were included in this unit. The unit is partially bordered on the west by the generalized eastern boundary of the 100-year Laguna de Santa Rosa floodplain, on the southwest by Hensley Road, on the south by Pepper Road (northwest of Petaluma), on the east generally by and near Petaluma Hill Road or by the urban centers of Santa Rosa and Rohnert Park, and on the north by the Town of Windsor. A segment of the 100-year floodplain that is located between the Stony Point Conservation Area (near Wilfred Avenue) and the Northwest Cotati Conservation Area (near Nahmens Road) is included within the final designation to prevent fragmentation of the northern and southern breeding concentrations within the unit, by allowing for potential dispersal and genetic exchange. Designated critical habitat excludes the urbanized centers of Santa Rosa, Bennett Valley, Rohnert Park, and Cotati. These urban centers consist almost exclusively of hardened, developed landscapes. The remnant natural habitat within these areas is limited to small, isolated parcels within a matrix of urban development. These areas are not included in the final rule because developed areas (lands covered by buildings, pavement, and other structures) lack the physical or biological features essential to the conservation of the species, according to section 3(5)(A) of the Act. We also do not consider the remnant open space within these city centers as essential for the conservation of the Sonoma County California tiger salamander. However some of these areas have been left inside the critical habitat boundaries shown on the maps of the final rule due to the mapping, but have been excluded by text in the final rule, and are not designated as critical habitat. This includes approximately 636 acres east of Stony Point Road and following the urban growth boundary east along Bellevue Avenue and south along Juniper Avenue to the intersection of Scenic Avenue and Highway 101.

The recovery role of critical habitat in the *Action Area* includes opportunities for providing suitable aquatic and upland habitat that supports one or more life stages of the Sonoma County California tiger salamander. With the designation of critical habitat, the Service intends to conserve the geographic areas containing the physical and biological features that are essential to the conservation of the species, through the identification of the appropriate quantity and spatial arrangement of the PCEs sufficient to support the life-history functions of the species. Not all life-history functions require all the PCEs and not all areas designated as critical habitat will contain all the PCEs. Refer to the final designation of critical habitat for Sonoma County California tiger salamander for additional information.

The *Action Area* includes the Santa Rosa Plains Unit for the Sonoma DPS of the California tiger salamander. The critical habitat unit was known to be occupied by Sonoma County California tiger salamanders at the time of listing. This unit is currently occupied by, and contains the following aquatic and associated upland features that are essential for the conservation of the species: vernal pool complexes and manmade ponds that are currently known to support breeding Sonoma County California tiger salamanders (PCE 1), upland habitats with underground refugia (PCE 2), and upland dispersal habitat allowing movement between occupied sites (PCE 3). Some areas already have anthropogenic stressors associated with intensive agricultural uses such as vineyards, urban and rural development, or disking for fire prevention. Approximately 1,418 acres of Preserves exist within designated critical habitat.

Effects of the Action

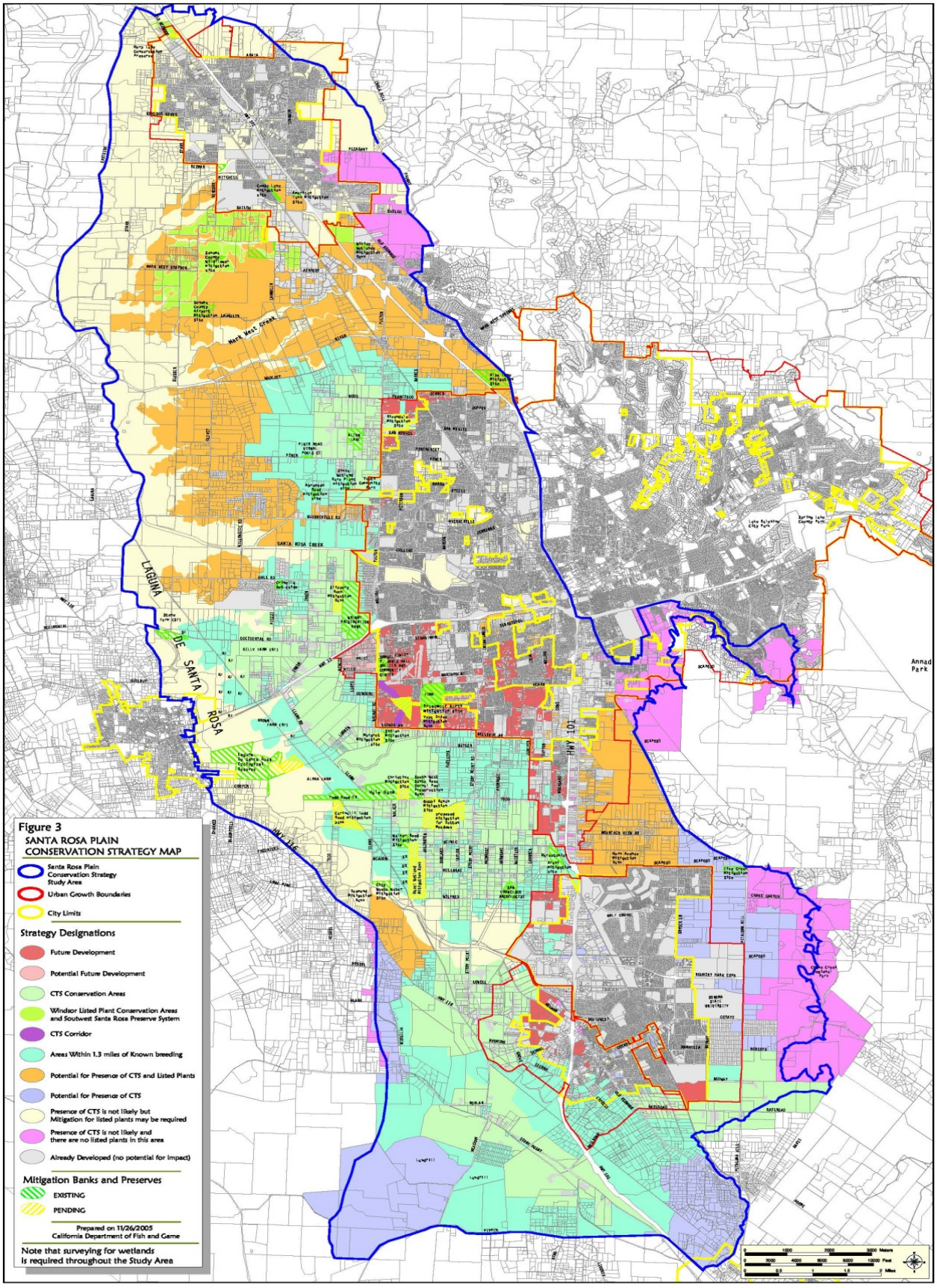
Adverse effects to the Sonoma County California tiger salamander and its critical habitat, and to Burke's goldfields, Sebastopol meadowfoam and Sonoma sunshine are expected to be caused primarily from urbanization related projects such as developing homes, industrial units, roads, and infrastructure. Project(s) appended to this programmatic biological opinion must adhere to the conservation measures described in the *Description of the Action* and are anticipated to protect and conserve the Sonoma County California tiger salamander, Burke's goldfields, Sebastopol meadowfoam and Sonoma sunshine.

Effects to Sonoma County California Tiger Salamander

Effects of the action are all consequences to listed species or critical habitat that are caused by the proposed action, including the consequences of other activities that are caused by the proposed action. A consequence is caused by the proposed action if it would not occur but for the proposed action and it is reasonably certain to occur. Effects of the action may occur later in time and may include consequences occurring outside the immediate area involved in the action.

Sonoma County California tiger salamanders within the Action Area of each project appended to this biological opinion will be subject to injury and death due to project activities. The majority of projects that adversely affect Sonoma County California tiger salamander and its habitat will likely be within the urban growth boundaries of the Cities of Santa Rosa, Cotati and Rohnert Park (Table 1 and Figure 6) (Conservation Strategy Team 2005). Some smaller projects may occur outside of the urban growth boundaries (Figure 6) within the Action Area due to rural residential, road, and other miscellaneous projects within Sonoma County jurisdiction. The area in which Sonoma County California tiger salamanders will be subject to injury and death is approximately 1,541 acres in Santa Rosa, 203 acres in Cotati, 203 acres in Rohnert Park, and 27 acres in the Town of Windsor.

Figure 6: Santa Rosa Plain Conservation Strategy Map



Injury and Mortality of Individuals

Ground Disturbance and Construction: Ground disturbance and construction activities associated with developing homes, industrial units, roads, and infrastructure will cause temporary and permanent loss of water bodies utilized by the species for breeding and maturation of larvae to metamorphs capable of living in the uplands, and also cause a loss of upland habitat used for dispersal, refugia, and foraging. Sonoma County California tiger salamanders that are using small mammal burrows or cracks in the soil within the construction footprint of the proposed action, are likely to be injured or killed during grading and ground compaction activities as burrows are crushed or as inhabitants of burrows are entombed or crushed. Sonoma County California tiger salamanders may be killed or injured from inadvertent trampling by workers and operation of construction equipment during construction activities. Construction activities will cause noise and vibration and will disturb Sonoma County California tiger salamanders causing them to leave their upland refugia and increase their exposure to desiccation and predation. Sonoma County California tiger salamanders will on occasion become trapped in open excavations or construction trenches, making them vulnerable to desiccation, starvation, and predation. While these effects are reasonably likely, they will be minimized by the conservation measures described in the *Minimization Measures and Best Management Practices* section above.

Roads: After initial ground disturbance for widening or building new roads, injury and mortality will occur when Sonoma County California tiger salamander attempt to cross new or widened roads during dispersal and migration in the fall and winter. Injury and mortality is expected to increase as a result of increased traffic. Road widening, new roads, or the placement of curbs at road edges, and constructed barriers within medians and along roadways which impede salamander movement will cause individuals more vulnerable to being run over by a vehicle (D. Cook, in literature, 2009). Injury and mortality of Sonoma California tiger salamander on roads in the Santa Rosa Plain is well documented (Cook 2008). Wildlife passages constructed as a minimization measure for some authorized projects will provide for movement of Sonoma County California tiger salamanders across roads, highways, or other anthropogenic barriers and will allow individuals to disperse into upland refugia and breeding habitat preventing road strikes (Cook 2008, Baine et. al. 2017).

Exposure to Contaminants: The construction of buildings and roadways, as well as the repair and use of roadways can expose Sonoma County California tiger salamanders to chemical contaminants. Substances used in road building materials or to recondition roads can drift or wash off into nearby habitat. Vehicles may leak hazardous substances such as motor oil and antifreeze. Sonoma California tiger salamanders may come into contact with these substances while migrating. Sonoma California tiger salamanders will absorb these contaminants through their skin, causing sickness and death, reducing fitness for the local population. Implementation of conservation measures related to managing stormwater runoff, fueling, storage of hazardous materials; having a spill containment plan in place; and informing project personnel of the importance of these measures, will reduce the potential for adverse effects from contaminants.

Habitat Loss, Degradation and Fragmentation

Ground Disturbance and Construction: Ground disturbance and construction activities associated with developing homes, industrial units, roads, and infrastructure in the Santa Rosa Plain will fill in, modify, and degrade wetlands causing permanent losses of wetlands utilized by the species for breeding and maturation of larvae to metamorphs. Grading within uplands and subsequent construction of homes, industrial units, roads, and infrastructure will cause a loss of upland habitat used for dispersal, refugia, and foraging. Much of the permitted housing development projects in recent years have been within the urban growth boundary of Santa Rosa and we expect a similar

trend in the next 5 to 10 years. Development will likely be a combination of infill projects causing a varied mix of habitat loss, degradation and fragmentation as the area within the urban growth boundary becomes built out. Sonoma County California tiger salamander habitat loss is estimated at approximately 1,541 acres in Santa Rosa, 203 acres in Cotati, 203 acres in Rohnert Park, 27 acres in the Town of Windsor in an area that has various levels of fragmented and isolated habitat. Some projects causing habitat loss may be authorized to occur outside of the urban growth boundaries and are not expected to compromise contiguous land with Sonoma County California tiger salamander wetland and upland habitat.

Homes, Industrial Units, Roads, and Infrastructure: Habitat fragmentation is an effect of habitat loss and occurs when remaining populations are isolated because the links between habitat patches have been destroyed. Habitat fragmentation also plays a role in reducing Sonoma County California tiger salamander abundances. California tiger salamanders require a large amount of barrier-free landscape for successful migration (Shaffer *et al.* 1993; Loredo *et al.* 1996). Urbanization can create permanent barriers that can isolate California tiger salamanders and prevent them from moving to new breeding habitat, or prevent them from returning to their breeding ponds or underground burrow sites. Roads and highways also create permanent physical obstacles and increase habitat fragmentation (Service 2003).

Permitted homes, industrial units, roads, and infrastructure will form barriers between habitats preventing Sonoma County California tiger salamander individuals from dispersing and migrating successfully to breeding wetlands. The effect will likely reduce breeding success in isolated breeding sites and prevent recolonization of those breeding sites from migrating salamanders. This will drive local populations to extinction and may happen within a short amount of time. One example is the Southwest Community Park breeding pool that is now surrounded by housing development and separated from uplands within dispersal distance. These factors can quickly drive a local population to extinction (Service 2016). Large, contiguous vernal pool complexes containing multiple breeding ponds are ideal to ensure that recolonization occurs at individual pond sites (Shaffer *et al.* 1993). We expect most of the wetland and upland habitat loss and fragmentation to be within the urban growth boundaries where the species is not likely to have viable populations in a long time period; however, some projects may occur outside of the urban growth boundaries.

Wildlife passages constructed as a minimization measure will provide for safer movement of Sonoma County California tiger salamanders across roads, highways, or other anthropogenic barriers. Although the method is experimental to date and adapted to the topography and other infrastructure constraints, they will allow individuals to disperse between upland and breeding habitat that would otherwise succumb to vehicle strikes (Cook 2008, Baine et. al. 2017). Improved movement of Sonoma County California tiger salamanders in some places will reduce the risk for local extirpation and allow for recolonization of habitat where breeding pools may only produce progeny in above average rainfall years.

Applicants for projects that will be appended to this programmatic biological opinion will purchase credits from conservation banks to minimize the effects of their projects. Conservation banks contain vernal pools, upland, and dispersal habitat. We expect using conservation banks to protect listed species and their habitat to have beneficial effects to the Sonoma County California tiger salamander. Conservation banks are protected with conservation easements, management plans, and endowments to protect and manage Sonoma County California tiger salamanders and their habitat in perpetuity. Conservation banks help establish essential connectivity, reduce fragmentation, and buffer against encroaching development. The wetland and upland habitat at conservation banks are protected and managed in perpetuity, eliminating many threats to the species. Conservation will improve protection for the Sonoma County California tiger salamander and habitats, improve

habitat quality, maintain or increase breeding and population size, increase extent of contiguous habitat, and increase connectivity between occupied areas. Implementation of management plans at Conservation Banks will ensure conservation values are maintained to provide optimal habitat conditions for the Sonoma County California tiger salamander over time as environmental conditions vary. Conservation banks are located in the Santa Rosa Plain and will help maintain the current geographic, elevational, and ecological distribution of the Sonoma County California tiger salamander, all goals of the Recovery Plan. Up to 3,519 acres of conservation banks will be protected in perpetuity within Sonoma County California tiger salamander habitat if full build out occurs within the urban growth boundaries as summarized in Table 1.

Effects to Critical Habitat for the Sonoma County California Tiger Salamander

The *Action Area* encompasses 41,045 acres (42,041 acres minus 636 acres) of Sonoma County California tiger salamander designated critical habitat. Approximately 636 acres in the urban growth boundary of Southwest Santa Rosa are not designated critical habitat as described in the *Status and Environmental Baseline of Sonoma California Tiger Salamander Critical Habitat* section above.

Implementation of development projects appended to this programmatic biological opinion will destroy, alter, fragment, and degrade up to 1,912 acres of designated Sonoma County California tiger salamander critical habitat within the *Action Area* comprised of a combination of PCE 1, PCE 2, and PCE 3. Therefore, approximately 39,133 acres of the 41,045 designated critical habitat within the *Action Area* will not be affected by projects appended to this programmatic biological opinion.

Sonoma County California tiger salamanders require both aquatic and terrestrial environments and migrate between the two habitat types. Grading and construction of homes, industrial units, roads, and infrastructure will fill, destroy, and modify vernal pools and manmade ponds that support breeding Sonoma California tiger salamanders (PCE1). The function of breeding habitat will be lost and unavailable to salamanders migrating in search of breeding habitat during the rainy season when wetlands typically fill up with rainwater. Grading land and constructing homes, industrial units, roads, and infrastructure will modify and remove upland habitats with underground salamander refugia (PCE 2) and upland habitat allowing salamander movement between occupied sites (PCE 3). New homes, industrial units, roads, and infrastructure will create new barriers to movement of Sonoma California tiger salamanders between these aquatic and terrestrial habitats. Isolation and fragmentation of the aquatic and upland habitats will reduce the recovery role of critical habitat that normally support the life stages of the Sonoma County California tiger salamander.

These adverse effects to critical habitat functions will primarily occur within the urban growth boundaries of Cotati, Rohnert Park, Santa Rosa, and Windsor where the habitat is currently more fragmented and subject to various anthropogenic stressors associated with residential and commercial activities. The development impacts associated primarily with houses and commercial buildings are likely to reduce the function and conservation value of the affected critical habitat by removing up to 1,912 acres of PCE's 1, 2, and 3. Some small development projects outside of the urban growth boundaries within Sonoma County may be appended to this programmatic biological opinion. Some of these areas already have anthropogenic stressors associated with intensive agricultural uses such as vineyards, rural development, or disking used in agriculture. Additional similar new activities may be appended to this programmatic biological opinion during the 10 (ten) year timeframe of this programmatic biological opinion. The conservation value of critical habitat will remain largely intact in the remaining 39,133 acres where the landscape is much more contiguous with open space, rural and pasture land, and conservation banks.

Similar to development projects that will potentially be appended to this programmatic biological opinion, approximately up to 3,519 acres of conservation banks will be established and protected in perpetuity within designated critical habitat of the Sonoma County California tiger salamander. These areas will have a combination of created, restored, or preserved aquatic breeding (PCE 1), upland refugia (PCE 2), and upland dispersal (PCE 3) habitat within land that is much more contiguous than the land within the urban growth boundaries of Cotati, Rohnert Park, Santa Rosa, and Windsor. Sonoma County California tiger salamander Preserves will contain vernal pools, upland refugia, and upland dispersal habitat to sustain populations of this species. The conservation banks will ensure preservation, enhancement, and management of the primary constituent elements. These conservation banks will assist in conserving contiguous habitat and linkages to other conserved areas for the Sonoma County California tiger salamander. The conservation will be in areas with reduced land use conflicts where the species can persist. These conservation banks are likely to enhance the conservation value of critical habitat in a highly beneficial manner by protecting critical habitat from any future development or incompatible activities. The protected critical habitat will be managed to benefit populations of the Sonoma County California tiger salamander. The location of new conservation banks will be strategically located adjacent or as close as possible to existing conservation banks to have the most impactful positive value to critical habitat as possible.

Effects to Burke's Goldfields, Sebastopol Meadowfoam, and Sonoma Sunshine

We expect the majority of projects to be within the urban growth boundaries of the Cities of Santa Rosa, Cotati and Rohnert Park (Figure 6) (Conservation Strategy Team 2005). They will consist of filling wetlands with suitable habitat and modifying or removing adjacent uplands to build homes, industrial units, roads, and infrastructure. Some smaller projects involving wetland fill and modification/loss of adjacent uplands may occur outside of the urban growth boundaries (Figure 6) within the *Action Area* due to rural residential, road, and other miscellaneous projects within Sonoma County jurisdiction.

Fill of Wetlands and Modification/Loss of Adjacent Uplands

Development projects will permanently fill Burke's goldfields, Sebastopol meadowfoam, and Sonoma sunshine suitable habitat with soil, concrete, pavement and buildings resulting in a decrease in numbers, reproduction potential, and distribution of these species. The destruction or ground disturbance of surrounding uplands will destroy or remove habitat for pollinator species that nest in the ground. This effect could result in reduced seed production of Burke's goldfields, Sebastopol meadowfoam, and Sonoma sunshine to other occupied wetlands within pollinator's dispersal distance.

We expect projects analyzed under this programmatic biological opinion may cause additional fragmentation and edge effects such as disking land to remove vegetation for fire prevention and off-road vehicle use. Disking can move soil into wetlands and make them shallower especially after repeated treatments. Fragmentation can make it more difficult for pollinators to find flowering plants or adversely affect hydrology between pools as further discussed below.

Alteration of Hydrology

Grading and ground disturbance to build homes, industrial facilities, and other structures will cut off or alter hydrology of nearby wetlands that may have a seed bank (whether increasing or decreasing). Disking can also change natural wetland hydrology. These types of disturbances can have cascading effects on the habitat and species because vernal pool plants are sensitive to variations in the timing and duration of vernal pool inundations (Bauder 2000). Repeated drying and filling of pools in the

spring favors development of Burke's goldfields, Sebastopol meadowfoam, and Sonoma sunshine. It is expected that disruption of connectivity between pools and destruction of hardpan will reduce pool inundation capabilities making the habitat unsuitable for seed germination and development. These effects are expected to occur where projects sites have wetland complexes that continue onto adjacent parcels.

It is also expected that created berms, walls, homes, and altered hydrology will in some cases cause seasonal wetlands to fill for extended periods of time during spring and summer months, which is typically not favorable to these vernal pool species. Extended inundation conditions will be favorable to plant species adapted to longer inundation periods and outcompete annual vernal pool plants.

Fill of Burke's goldfields, Sebastopol meadowfoam, and Sonoma sunshine suitable habitat will occur within an area of approximately 1,541 acres in Santa Rosa, 203 acres in Cotati, 203 acres in Rohnert Park, and 27 acres in the Town of Windsor (Table 1). The amount of wetlands with suitable habitat will be assessed and determined on a project-by-project site basis.

Conservation Measures

Applicants will purchase credits from conservation banks to minimize the effects of their projects. We expect using conservation banks to protect listed species and their habitat to have net beneficial effects for all these listed plant species. Conservation banks are protected with conservation easements, management plans, and endowments to protect and manage Burke's goldfields, Sebastopol meadowfoam, and Sonoma sunshine and their habitat in perpetuity. The conservation banks have habitat of sufficient size with wetland habitat and uplands suitable for pollinators, provide connectivity to other Preserves and reduce the current threat of fragmentation. Conservation banks protect Burke's goldfields, Sebastopol meadowfoam, and Sonoma sunshine and will provide future opportunities for replication. Implementation of management plans at Conservation Banks will ensure conservation values are maintained to provide optimal habitat conditions for Burke's goldfields, Sebastopol meadowfoam, and Sonoma sunshine over time as environmental conditions vary. Conservation banks are located in the Santa Rosa Plain and will help maintain the current geographic, elevational, and ecological distribution of these species, all goals of the Recovery Plan.

Cumulative Effects

Cumulative effects include the effects of future state, tribal, local, or private actions that are reasonably certain to occur in the *Action Area* are considered in this programmatic biological opinion. Future federal actions that are unrelated to the proposed action are not considered in this section; they require separate consultation pursuant to Section 7 of the Act. Seasonal wetlands are extensive in the Santa Rosa Plain and receives around 30 inches of rain during the rainy season. Most projects are likely to require a Corps permit and thus will have a federal nexus for consultation under Section 7 of the Act. However, an undetermined amount of future land use conversions and intensive and routine agricultural practices frequently are not reviewed for environmental compliance under the federal permitting process. It is expected that some new intensive agriculture including vineyard, row crops, cannabis grows, recycled water spray irrigation, and their infrastructure will occur within the *Action Area*. These activities are reasonably certain to occur in the future because they are ongoing.

Cumulative Effects to Sonoma County California Tiger Salamander

Cumulative effects to the Sonoma County California tiger salamander include conversion of breeding, foraging, sheltering, and dispersal habitat to human land uses such as vineyard, row crops, and cannabis grows. Approximately 40 acres of habitat have been adversely affected by cannabis activities over the last few years. Some methods to convert habitat may include clearing, grubbing, plowing, disking, or tilling with mechanical equipment. The mechanical equipment and soil movement and compaction will injure and kill adults and juveniles taking refuge underground such as in gopher burrows, other rodent holes, or soil desiccation cracks. The loss of enough individuals in an area will cause local extirpation depending on the ability for surviving individuals to disperse overland to breeding habitat and reproduce. The loss of any breeding habitat can have a significant effect on a population depending on the availability of other accessible breeding habitat for migrating adults in search of breeding habitat.

These intensive agriculture activities, their infrastructure and land management in the uplands or non-jurisdictional Corps wetlands will indirectly affect Sonoma California tiger salamanders. They will (1) reduce and fragment Sonoma California tiger salamander habitat; (2) interfere with the ability of salamanders to travel the distances necessary to reach breeding or upland habitat while rain or moisture conditions are suitable; (3) remove and reduce breeding habitat; (4) expose animals to potentially toxic levels of fertilizers, pesticides, fungicides, and herbicides; (5) reduce small mammal and their burrows that provide shelter; and (6) increase Sonoma County California tiger salamanders' susceptibility to predators and human activities.

Because the majority of existing vineyards are within the Alton Lane Management Area, we expect most new vineyards will occur within the Alton Lane Management Area. Sonoma California tiger salamanders have not been studied to determine the extent that individuals or populations persist in or near vineyards in the Santa Rosa Plain. Conversion of rural lands to vineyards can include creating permanent wetlands that are more suitable for bullfrogs, fish, and the eastern tiger salamander. If populations of these aquatic non-native species become established, they will negatively affect the Sonoma County California tiger salamander through predation and hybridization with the non-native eastern tiger salamander. Hybridization between the eastern tiger salamander is of great concern and can contaminate the native gene pool if eastern tiger salamanders reach populations in any of the Core Areas.

Recycled water spray irrigation is also anticipated to increase to some extent within breeding, foraging, sheltering, and dispersal habitat. This activity will modify the behavior of California tiger salamanders by spraying water in the dry summer months. The extent of the effects are not well understood and has not been studied, however, Sonoma County California tiger salamanders have been observed above ground in the uplands after the application of spraying for dust control when wetlands were being created at an established conservation bank. This will make individuals susceptible to desiccation, predation, or anthropogenic stressors if tiger salamanders emerge from their refugia during the hot summer months.

Cumulative Effects to Sonoma County California Tiger Salamander Critical Habitat

Cumulative effects to the Sonoma County California tiger salamander critical habitat include conversion of the PCE's 1, 2, and 3 to human land uses such as vineyard, row crops, and cannabis grows. Some methods to convert critical habitat may include clearing, grubbing, plowing, disking, or tilling with mechanical equipment. Conversion to these intensive agricultural uses will also destroy critical habitat where supporting structures and infrastructure are built. Since these effects will occur

absent of a federal nexus, we expect most of the effects to occur to PCE's 2 and 3. However, illegal cannabis grows are reasonably certain to adversely affect PCE 1, 2, and 3.

Because the majority of existing vineyards are within the Alton Lane Management Area, we expect most new vineyards will occur primarily within the Alton Lane Management Area.

Cannabis grows have been observed in most areas of the Santa Rosa Plain but are more frequently within the Llano Crescent – Stony Point Core Recovery Area of the Santa Rosa Plain Recovery Plan. Therefore, we expect the majority of future cannabis grows to occur within this area, although they will also likely continue to occur throughout the *Action Area*. We expect that a combination of education and enforcement efforts from the local and state jurisdictions will reduce the amount and frequency of adverse effects from cannabis grows.

Cumulative Effects to Burke's goldfields, Sebastopol meadowfoam and Sonoma sunshine

Cumulative effects to Burke's goldflields, Sebastopol meadowfoam, and Sonoma sunshine include conversion of suitable habitat and pollinator habitat to human land uses such as vineyard, row crops, and cannabis grows. Some methods to convert suitable habitat may include clearing, grubbing, plowing, disking, or tilling with mechanical equipment. The mechanical equipment and soil movement and compaction will modify or destroy suitable habitat and pollinator habitat. Plowing disking, or tilling in areas where there is a seed bank will distribute seed at varying depths in the soil. Seed buried in deeper soil will either not germinate as readily or at all; however research is needed to better understand the depth and soil conditions these species can tolerate.

Recycled water spray irrigation is also anticipated to continue within suitable habitat and pollinator habitat. This activity will modify the normal hydroperiod and create conditions more favorable to non-native vegetation that outcompete these endangered plants. While the native seasonal wetland species are adapted to a summer-dry Mediterranean climate, summer irrigation results in perennial wetland conditions that are intolerable by native seasonal wetland species (Patterson et al. 1994).

Conclusion

Sonoma County California tiger salamander, Burke's goldfields, Sebastopol meadowfoam and Sonoma sunshine

After reviewing the current status of the Sonoma County California tiger salamander, Burke's goldfields, Sebastopol meadowfoam and Sonoma sunshine, the environmental baseline for the *Action Area*, the effects of the proposed action, and the cumulative effects, it is the Service's biological opinion that projects which meet the qualifications for this programmatic biological opinion are not likely to jeopardize the continued existence of the these listed species. The Service reached this conclusion because the project-related effects to the species, when added to the environmental baseline and analyzed in consideration of all potential cumulative effects, will not rise to the level of precluding recovery or reducing the likelihood of survival of the species based on the following: (1) Numerous conservation measures will be implemented to minimize adverse effects to the Sonoma County California tiger salamander, Burke's goldfields, Sebastopol meadowfoam and Sonoma sunshine; (2) the conservation banks are protected with conservation easements and include implementation of management plans that ensure conservation values will be maintained and provide optimal habitat conditions for Sonoma County California tiger salamander, Burke's goldfields, Sebastopol meadowfoam, and Sonoma sunshine; (3) purchase of credits at conservation banks for Burke's goldfields, Sebastopol meadowfoam, and Sonoma sunshine suitable habitat will protect and manage native and established occurrences providing future opportunities for

replication which is important for recovery; and (4) implementing the conservation ensures more occupied habitat will be conserved than affected and we expect that the amount protected will ensure that issuance of Corps permits does not preclude the ability to meet the preservation goals in the Conservation Strategy and ensure these species will persist and maintain their current geographic distribution and maintain or increase reproduction and numbers.

Sonoma California Tiger Salamander Critical Habitat

After reviewing the current status of designated critical habitat for the Sonoma County California tiger salamander, the environmental baseline for the *Action Area*, the effects of the proposed action and the cumulative effects, it is the Service's biological opinion that projects which meet the qualifications for this programmatic biological opinion are not likely to destroy or adversely modify designated critical habitat. The Service reached this conclusion because the project-related effects to the designated critical habitat, when added to the environmental baseline and analyzed in consideration of all potential cumulative effects, will not rise to the level of precluding the function of the Sonoma County California tiger salamander critical habitat to serve its intended conservation role for the species based on the following: (1) Approximately 40,129 acres of the 42,041 designated critical habitat within the *Action Area* will remain after 1,912 acres of designated critical habitat will be destroyed, altered, degraded, or further fragmented; and (2) up to 3,519 acres of designated critical habitat will be protected in perpetuity and managed to benefit the Sonoma County California tiger salamander habitat. The effects to Sonoma County California tiger salamander critical habitat are not expected to appreciably diminish the value of the critical habitat or prevent it from sustaining its role in the conservation of the Sonoma County California tiger salamander.

PROGRAMMATIC INCIDENTAL TAKE STATEMENT

Section 9 of the Act and federal regulation pursuant to section 4(d) of the Act prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harass is defined by FWS regulations at 50 CFR 17.3 as an intentional or negligent act or omission which creates the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding, or sheltering. Harm is defined by the same regulations as an act which actually kills or injures wildlife. Harm is further defined to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavior patterns, including breeding, feeding, or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the Act provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement.

The measures described below are non-discretionary, and must be undertaken by the Corps so that they become binding conditions of any grant or permit issued to the applicant, as appropriate, for the exemption in section 7(o)(2) to apply. The Corps has a continuing duty to regulate the activity covered by this incidental take statement. If the Corps (1) fails to assume and implement the terms and conditions or (2) fails to require the applicant to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit or grant document, the protective coverage of section 7(o)(2) may lapse. In order to monitor the impact of incidental take, the Corps via the applicant must report the progress of the action and its impact on the species to the Service as specified in the incidental take statement [50 CFR §402.14(i)(3)].

Sections 7(b)(4) and 7(o)(2) of the Act generally do not apply to listed plant species. However, limited protection of listed plants from take is provided to the extent that the Act prohibits the removal and reduction to possession of federally listed endangered plants or the malicious damage of such plants on areas under federal jurisdiction, or the destruction of endangered plants on non-federal areas in violation of State law or regulation or in the course of any violation of a State criminal trespass law.

Amount or Extent of Take

Sonoma County California tiger salamander

The specific amount or extent of incidental take of the Sonoma County California tiger salamander is unquantifiable at this time because this consultation has analyzed the proposed action at a programmatic level. The Corps will submit individual projects to the Service for specific review and analysis by the Service. If appropriate, incidental take will be authorized upon appendage of the specific project to this programmatic biological opinion. No exemption from section 9 of the Act is granted in this programmatic biological opinion.

Effect of the Take

No incidental take is authorized by this programmatic biological opinion for the Sonoma County California tiger salamander.

Reasonable and Prudent Measures

1. The Corps shall request appropriate specific projects permit actions that may adversely affect the Sonoma County California tiger salamander be appended to this programmatic biological opinion.

2. The Corps shall minimize adverse effects to the Sonoma County California tiger salamander by authorizing the permittee to implement the project description as described with the additional terms and conditions below.

Terms and Conditions

In order to be exempt from the prohibitions of section 9 of the Act, the Corps must ensure compliance with the following term and condition, which implement the reasonable and prudent measure described above. These terms and conditions are nondiscretionary.

1. The following Term and Condition implements Reasonable and Prudent Measure One (1):

    a. The Corps shall ensure each project permit action submitted for appendage to this programmatic biological opinion meets the conditions and requirements in the project description of this document.

2. The following Term and Condition implements Reasonable and Prudent Measure two (2):

    a. The Corps shall include full implementation and adherence to the conservation measures as a condition of any permit issued for appended projects.

The reasonable and prudent measures, with their implementing terms and conditions, are designed to minimize the impact of programmatic incidental take that might otherwise result from the

proposed action. If, during the course of a project appended to this programmatic biological opinion, the level of incidental take described for the Sonoma County California tiger salamander is exceeded, such incidental take represents new information requiring review of the project, and, if appropriate, reinitiation of programmatic consultation and review of the reasonable and prudent measures provided. The Corps must provide an explanation of the causes of the take as soon as possible and review with the Service the need for possible review of the project, or modification of the reasonable and prudent measures.

Monitoring and Reporting Requirements:

In order to monitor whether the amount or extent of incidental take anticipated from implementation of the project is approached or exceeded, the Corps shall adhere to the following reporting requirements. Should this anticipated amount or extent of incidental take be exceeded, the Corps must immediately reinitiate formal consultation as per 50 CFR 402.16.

a. For each project appended to this programmatic biological opinion that will result in habitat degradation or modification whereby incidental take in the form of harm is anticipated, the Corps via the applicant's Service-approved biologist(s) will provide prompt updates to the Service with an accounting of the total acreage of habitat impacted by the project appended to this programmatic biological opinion. The total acreage of habitat impacted by the project shall be compared to the acreage authorized in the Corps permit(s) and appendage to this programmatic biological opinion. The Corps will provide annual updates to the Service with an accounting of the total acreage of habitat impacted by the projects appended to this programmatic biological opinion.

b. For each project appended to this programmatic biological opinion that may result in direct encounters between listed species and project workers and their equipment whereby incidental take in the form of harm, injury, or death is anticipated, the Corps via the applicant's Service-approved biologist(s) shall report the encounter(s) as described in the *Description of the Proposed Action* section. If encounter occurs after normal working hours, the Corps shall contact the SFWO at the earliest possible opportunity the next working day. When injured or killed individuals of the listed species are found, the Corps shall follow the steps outlined in the Salvage and Disposition of Individuals section below.

c. For those components of the action that will require the capture and relocation of any listed species, the Corps via the applicant's Service-approved biologist(s) shall immediately contact the SFWO at (916) 414-6623 to report the action. If capture and relocation need to occur after normal working hours, the Corps shall contact the SFWO at the earliest possible opportunity the next working day.

d. For each project appended to this programmatic biological opinion, the Corps shall provide pre- and post- construction compliance reports as described in the *Administration of the Programmatic Biological Opinion* section of this programmatic biological opinion.

Salvage and Disposition of Individuals:

Injured Sonoma County California tiger salamanders must be cared for by a licensed veterinarian or other qualified person(s), such as the Service-approved biologist. Notification must include the date, time, and precise location of the individual/incident clearly indicated on a USGS 7.5 minute quadrangle and other maps at a finer scale, as requested by the Service, and any other pertinent information. Dead individuals of any of these listed animal must be sealed in a zip-lock® plastic bag

containing a paper with the date and time when the animal was found, the location where it was found, and the name of the person who found it, and the bag containing the specimen frozen in a freezer located in a secure site. The Service contact persons are Ryan Olah, (916) 414-6623, (ryan_olah@fws.gov) or Vincent Griego, (916) 414-6493, (vincent_griego@fws.gov).

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the Act directs federal agencies to utilize their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information. The Service recommends the following actions:

1. Assist the Service in implementing recovery actions identified within the most current Recovery Plan for the Santa Rosa Plain.

2. Report sightings of all listed and sensitive species to the CNDDB. A copy of the reporting form and a topographic map clearly marked with the location of the species observed also should be provided to the Service.

In order for the Service to be kept informed of actions minimizing or avoiding adverse effects or benefiting listed species or their habitats, the Service requests notification of the implementation of any conservation recommendations.

REINITIATION—CLOSING STATEMENT

This concludes formal consultation on the actions described in this programmatic biological opinion within the Santa Rosa Plain, Sonoma County, California. As provided in 50 CFR §402.16(a), reinitiation of consultation is required and shall be requested by the federal agency or by the Service where discretionary federal involvement or control over the action has been retained or is authorized by law, and:

1) If the amount or extent of taking specified in the incidental take statement is exceeded;

2) If new information reveals effects of the action that may affect listed species or critical habitat in a manner or to an extent not previously considered;

3) If the identified action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in the biological opinion; or written concurrence, or

4) If a new species is listed or critical habitat designated that may be affected by the identified action.

If you have any questions regarding this programmatic biological opinion, please contact Ryan Olah, Coast Bay Division Chief, (ryan_olah@fws.gov), or at (916) 414-6623 or the letterhead address.

Sincerely,

Jennifer M. Norris, Ph.D.
Field Supervisor

LITERATURE CITED

Association of Bay Area Governments (ABAG). 2013. Bay Area Plan. Strategy for a sustainable region. Final forecast for jobs, population and housing. July 2013. 152 pp. http://onebayarea.org/pdf/final_supplemental_reports/FINAL_PBA_Forecast_of_Jobs_Population_and_Housing.pdf. Accessed October 30, 2014.

Baine, T., D. Cook, and D. Girman. 2017. Evaluating the Effects of Abiotic and Biotic Factors on Movement Through Wildlife Crossing Tunnels During Migration of the California Tiger Salamander, Ambystoma Californiense. Herpetological Conservation and Biology. 12:192-201.

Bauder, E.T. 2000. Inundation effects on small-scale plant distributions in San Diego, California vernal pools. Aquatic Ecology 34: 43 – 61.

Benfenati, E., S. Valzacchi, G. Maniani, L. Airoldi, R. Farnelli. 1992. PCDD, PCDF, PCB, PAH, cadmium and lead in roadside soil: relationship between road distance and concentration. Chemosphere24:1077 1083.

Black, S., M. Shepherd, M Vaughan, C LaBar, and N Hodges. 2009. Yolo Natural Heritage Program (HCP/NCCP) Pollinator Conservation Strategy. The Xerces Society for Invertebrate Conservation. Portland, Oregon / Sacramento, California.

Bobzien, S. and J.E. DiDonato. 2007. The status of the California tiger salamander (Ambystoma californiense), California red-legged frog (Rana draytonii), foothill yellow-legged frog (Rana boylii), and other aquatic herpetofauna in the East Bay Regional Park District, California. East Bay Regional Park District, Oakland, California.

California Department of Fish and Game. 2010. A Status Review of the California Tiger Salamander (Ambystoma californiense). Report to the Fish and Game Commission. Betsy C. Bolster, Nongame Wildlife Program Report 2010-4, January 11, 2010. 57 pp + fig and appendices.

California Native Plant Society (CNPS). 2001. Inventory of Rare and Endangered Plants of California (sixth edition). Rare Plant Scientific Advisory Committee, David P. Tibor, Convening Editor. California Native Plant Society. Sacramento, California. x + 3888 pp.

California Natural Diversity Data Base (CNDDB). 2018. Natural Heritage Division. California Department of Fish and Wildlife, Sacramento, California.

Cayan, D., M. Dettinger, I. Stewart and N. Knowles. 2005. Recent changes toward earlier springs – Early signs of climate warming in western North America. Watershed Management Council Networker, 13, Spring. Pages 3-9.

CH2M Hill. 1995. Phase 1 Final Report, Santa Rosa Plain Vernal Pool Ecosystem Preservation Plan. Prepared for Sonoma County Vernal Pool Task Force, Santa Rosa, California.

City of Santa Rosa. 2014. Vernal Pools of the Santa Rosa Plain. Available at http://ci.santa-rosa.ca.us/doclib/documents/VernalPool.pdf. Accessed on May 14, 2014.

Conservation Strategy Team. 2005. Santa Rosa Plain Conservation Strategy. Final. December 1, 2005.

Cook, David. 2008. Revised Draft CTS Feasibility Study. California Tiger Salamander Habitat Protection and Enhancement for the Southwest Cotati Conservation Area: Feasibility Study.

Emery, Nancy. 2016. Conservation Genetics and Habitat Mitigation for Lasthenia burkei (Burke's goldfields) and L. conjugens (Contra Costa Goldfields) in the Bay Delta Region. Federal Endangered Species Act Traditional Section 6 Grant Project Narrative (Proposal). Section 6 Traditional Grant Program.

Field, C.B., G.C. Daily, F.W. Davis, S. Gaines, P.A. Matson, J, Melack, and N.L. Miller. 1999. Confronting Climate Change in California. Ecological Impacts on the Golden State. A Report of the Union of Concerned Scientists and the Ecological Society of America.

Fisher, R.N. and H.B. Shaffer. 1996. The decline of amphibians in California's Great Central Valley. Conservation Biology 10(5): 1387-1397.

Flint, L and Flint, A. 2012. Downscaling future climate scenarios to fine scales for hydrologic and ecological modeling and analysis. Ecological Processes, Vol. 1.

Gilpin, M. E. and M. E. Soulé. 1986. "Minimum viable populations: processes of species extinction." Pages 18-34. In M. E. Soulé (editor). Conservation Biology: The Science of Scarcity and Diversity. Sinauer Associates, Inc., Sunderland, Massachusetts.

Hopwood, J., E. Lee-Mader, L. Morandin, M. Vaughan, C. Kremen, J. Kay Cruz, J. Eckberg,

S. Foltz Jordan, K. Gill, T. Heidel-Baker, and S. Morris. 2016. Habitat Planning for Beneficial Insects. Guidelines for Conservation Biological Control. The Xerces Society for Invertebrate Conservation.

Intergovernmental Panel on Climate Change (IPCC). 2013. Climate Change 2013. The Physical Science Basis, Working Group I Contribution to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change. Cambridge University Press. 1552 pp. Accessed at http://ipcc.ch.

Lacey, T., G. Molnar, J.G. Monk, S. Talley, L.P. Stromberg, T.P. Winfield. 2007. White Paper Report, prepared in response to USFWS presentation on proposed revisions to the programmatic biological opinion for the Santa Rosa Plain. Unpublished report.

Laguna de Santa Rosa Foundation. Adopt-a-Vernal-Pool Program (AVP). Available at http://www.citizen-science.org/Laguna/rdPage.aspx). Accessed November 5, 2014.

Leyse, K. and S.P. Lawler. 2000. Effects of mosquitofish (Gambusia affinis) on California tiger salamander (Ambystoma californiense) larvae in permanent ponds. Mosquito Control Research Annual Report 2000. University of California Davis, Division of Agriculture and Natural Resources. Pages 75-76.

McCarten, N.F. 1985. A survey of Navarretia pauciflora and Navarretia plieantha (Polemoniaceae): Two rare endemic plant species from the vernal pools of the California North Coast Ranges. Unpublished report. Endangered Plant Program. California Department of Fish and Game. Sacramento, California.

Ornduff, Robert. 1993. Lasthenia. Page 298-300 in J. C. Hickman (editor), The Jepson Manual: Higher Plants of California. Press, Berkeley and Los Angeles, University of California.

Patterson, C.A., B. Guggolz, and M. Waaland. 1994. Seasonal Wetland Baseline Report for the Santa Rosa Plain, Sonoma County. Report to California Department of Fish and Game, Yountville, California.

Patterson, C.A. 2013. Supplemental Botanical Detail Report (Translocation of Burke's Goldfields) For the Windmill Conservation Site. 4515 Santa Rosa Avenue, Sonoma County, California.

Seymour, R. and M. Westphal. 1994. Distribution of California tiger salamanders in the eastern San Joaquin Valley: Results of the 1994 survey. Prepared for Coyote Creek Riparian Station. Prepared for U.S. Fish and Wildlife Service, Sacramento Fish and Wildlife Office.

Shaffer, H.B., R.N. Fisher, and S.E. Stanley. 1993. Status report: the California tiger salamander (Ambystoma californiense). Final report for the California Department of Fish and Game. 36 pp. plus figures and tables.

Shepard, D. B., Kuhns, A. R., Dreslik, M. J., and C. A. Phillips. 2008. Roads as barriers to animal movement in fragmented landscapes. Animal Conservation 11: 288-296.

Sloop, C.M., R. Eberl, and D.R. Ayres. 2012a. Genetic diversity and structure in the annual vernal pool endemic Limnanthes vinculans Ornduff (Limnanthaceae): implications of breeding system and restoration practices. Conservation Genetics 13:1365-1379.

Sloop. C.M., Gilmore, K., Brown, H. and N. Rank. 2012b. FINAL PROJECT REPORT E-2-P-35. An Investigation of the Reproductive Ecology and Seed Bank Dynamics of Burke's Goldfields (Lasthenia burkei), Sonoma Sunshine (Blennosperma bakeri), and Sebastopol Meadowfoam (Limnanthes vinculans) in Natural and Constructed Vernal Pools. U.S. Fish and Wildlife Service: Endangered Species Act (Section-6) Grant-in-Aid Program. Prepared for California Department of Fish and Game, Habitat Conservation Division.

Sonoma County Winegrape Commission. Vineyard Planting in Sonoma County. Available at http://sonomawinegrape.org/grower-resources/business-practices/regulatory-issues/. Accessed on October 6, 2017.

Trombulak, S. C. and C. A. Frissell. 2000. The ecological effects of roads on terrestrial and aquatic communities: a review. Conservation Biology 14:18-30.

U.S. Fish and Wildlife Service (Service). 1991. Determination of endangered status for three plants: Blennosperma bakeri (Sonoma sunshine or Baker's stickyseed), Lasthenia burkei (Burke's goldfields), and Limnanthes vinculans (Sebastopol meadowfoam). 56 Federal Register 61173.

_____ 1998. Programmatic Formal Consultation for U.S. Army Corps of Engineers 404 Permitted Projects that May Affect Four Endangered Plant Species on the Santa Rosa Plain, California (File Number 22342N). 36 pp.

_____ 2003. Interim Guidance on Site Assessment and Field Surveys for Determining Presence or a Negative Finding of the California Tiger Salamander. Sacramento Field Office, Sacramento, California.

_____ 2005a. Endangered and Threatened Wildlife and Plants; Designation of Critical Habitat for the California Tiger Salamander in Sonoma County. Federal Register 70: 44301-44322.

_____ 2005b. Endangered and Threatened Wildlife and Plants; Designation of Critical Habitat for the Sonoma County Distinct Population Segment of the California Tiger Salamander; Final Rule. Federal Register 70: 74137-74163.

_____ 2007. Programmatic Biological Opinion (Programmatic) for U.S. Army Corps of Engineers (Corps) Permitted Projects that May Affect California Tiger Salamander and Three Endangered Plant Species on the Santa Rosa Plain, California (Corps File Number 223420N); Service file number 81420-2008-F-0261), dated November 9, 2007.

_____ 2009. Endangered and Threatened Wildlife and Plants; Designation of Critical Habitat for the Sonoma County Distinct Population Segment of California Tiger Salamander (Ambystoma californiense). Federal Register 74(158): 41662 41673.

_____ 2011. Endangered and threatened wildlife and plants; revised designation of critical habitat for the Sonoma County distinct population segment of California tiger salamander. Federal Register 76(169):54345 - 54372.

_____ 2016. Recovery Plan for the Santa Rosa Plain: Blennosperma bakeri (Sonoma sunshine); Lasthenia burkei (Burke's goldfields); Limnanthes vinculans (Sebastopol meadowfoam); California Tiger Salamander Sonoma County Distinct Population Segment (Ambystoma californiense). U.S. Fish and Wildlife Service, Pacific Southwest Region, Sacramento, California. vi + 128 pp.

U.S. Geological Service (USGS) National Wildlife Health Center. 2001. Restraint and handling of live amphibians. http://www.nwhc.usgs.gov/publications/amphibian_research_procedures/handling_and_restraint.jsp. Accessed November 5, 2014.

Personal Communications

Buss, S. 2012. Santa Rosa Plain Seed Source. California Department of Fish and Wildlife, Yountville, California.

Buss, S. 2014. California Department of Fish and Wildlife, Yountville, California.

Buss, S. 2014. Santa Rosa Plain Inoculum Tree. California Department of Fish and Wildlife, Yountville, California.

Chamberlin, P. 2008. Building and Planning Director, Town of Windsor, California. E-mail to Vincent Griego (USFWS staff) and Liam Davis (CDFG).

Cook, D. 2009. Letter from Dave Cook, Herpetologist. Comments on the proposed rule to list the California tiger salamander under CESA. Letter to Betsy Bolster, California Department of Fish and Wildlife.

Studen, L. 2017. Electronic mail to Vincent Griego. Number of preserve acres within Sonoma County California tiger salamander critical habitat based on CDFW preserves shapefile.

Sweet, S. 1998. Letter to Dwight Harvey, U.S. Fish and Wildlife Service with a report titled "Vineyard Development Posing an Imminent Threat to Ambystoma californiense in Santa Barbara County, California." University of California, Santa Barbara, California.

Wilson, S. 2007. California Department of Fish and Wildlife, Yountville, California.