United States Department of the Interior

FISH AND WILDLIFE SERVICE
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In reply refer to:
81420-2008-F-1639

Memorandum

To: Assistant Field Supervisor, Endangered Species Program, Sacramento Fish and Wildlife Office, Sacramento, California

From: Division Chief, Conservation Planning and Recovery, Endangered Species Program, Sacramento Fish and Wildlife Office, Sacramento, California

Subject: Intra-Service Biological Opinion on Issuance of a Section 10(a)(1)(B) Incidental Take Permit for the Low-Effect Habitat Conservation Plan the California Tiger Salamander and Sebastopol Meadowfoam Proposed Community School Site, Santa Rosa, California

This document transmits the biological opinion of the U.S. Fish and Wildlife Service (Service), Sacramento Fish and Wildlife Office (SFWO), regarding the issuance of an incidental take permit (Permit) to the Sonoma County Office of Education (SCOE or Applicant) for actions associated with their proposed construction of the Dutton Avenue Community School pursuant to section 10(a)(1)(B) and section 10(a)(2) of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 § *et seq.*) (Act), and in accordance with section 7 of the Act and their implementing regulations (50 CFR §402). These actions are described in the "Low-Effect Habitat Conservation Plan, California tiger salamander and Sebastopol meadowfoam, Proposed Community School Site, City of Santa Rosa, California" (HCP) for the subject action. The Service proposes to issue this Permit to SCOE for a period of five years, which will authorize incidental take of the endangered Sonoma County Distinct Population Segment of the California tiger salamander (*Ambystoma californiense*) (California tiger salamander or Covered Species) and the endangered Sebastopol meadowfoam (*Limnathese vinculans*) (Covered Species) within the HCP boundaries (Plan Area).

This opinion discusses project effects on the endangered California tiger salamander, endangered Sebastopol meadowfoam, endangered Burke's goldfields (*Lasthenia burkei)* (goldfields), and endangered Sonoma sunshine (*Blennosperma bakeri*). The Permittee is requesting coverage for two Covered Species, the California tiger salamander and the Sebastopol meadowfoam. Although take of plant species is not prohibited under the Act and therefore cannot be authorized under an incidental take permit, the plant species would be included on the permits in recognition of the conservation benefits provided to the species under the HCP. Assurances provided under

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To: Assistant Field Supervisor, Endangered Species Program, Sacramento Fish and Wildlife Office, Sacramento, California

From: Eric Tattersall
Act. Division Chief, Conservation Planning and Recovery, Endangered Species Program, Sacramento Fish and Wildlife Office, Sacramento, California

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the "No Surprises" rule at 50 CFR 17.3, 17.22(b)(5), and 17.32(b)(5) would extend to the two Covered Species.

Based upon the information provided, the Service has determined the proposed project is not likely to adversely affect the many-flowered navarretia (*Navarretia leucocephala* ssp. *plieantha*). This is based on: (1) the fact that all but one of the known occurrences of this species occurs outside the Santa Rosa Plain; (2) the closest known occurrence is located approximately 9 miles (14.5 km) northwest of the proposed project; and (3) numerous botanical surveys conducted over multiple years (1993, 1999, 2000, 2001, and 2008), during the appropriate bloom seasons, did not detect the species within the project area (Northern 1993; Jane Valerius Environmental Consulting 2001; and Stromberg 2008).

This biological opinion is based on information provided in the following documents: (1) the SCOE permit application; (2) the May 2008 HCP (Stromberg 2008); (3) a site visit conducted on April 10, 2008; (4) the August 07, 2008, final Low-Effect Screening Form and Environmental Action Statement (EAS)(Service 2008); (5) final Santa Rosa Plain Conservation Strategy dated December 1, 2005 (SRPCS); (6) miscellaneous correspondence concerning the proposed project between the Service and Laurence P. Stromberg; and (7) other information available to the Service.

Consultation History

November 21, 2007: The Service received the following documents: (1) a Habitat Conservation Plan dated November 12, 2007; (2) tiger salamander survey report dated January 13, 2004; (3) wetland re-delineation dated July 17, 2007; (4) habitat quality evaluation dated June 26, 2007; (5) results of botanical surveys dated July 26, 2003 and April 8, 2001; (6) cultural resources report dated August 8, 2007; and (7) an application check in the amount of $100.00.

April 10, 2008: The Service participated in a site visit with representatives from SCOE and Laurence P. Stromberg.

April 14, 2008: The Service received a botanical survey for the proposed project site dated April 13, 2008.

April 16, 2008: The Service sent an electronic mail message to a representative of Laurence P. Stromberg Wetlands Consultant regarding the purchase of plant credits for the proposed HCP.

April 17, 2008: The Service received an electronic mail message from Harvey Rich stating plant credits are proposed to be purchased from the Swift/Turner Conservation Bank.

April 23, 2008:	The Service sent an electronic mail message to a representative of Laurence P. Stromberg requesting additional information regarding the HCP's proposed mitigation ratio for plants.
April 23, 2008:	The Service received an electronic mail message from a representative of Laurence P. Stromberg stating the proposed mitigation ratio for plants is 1.5 to 1.0.
April 28, 2008:	The Service sent an electronic mail message to a representative of Laurence P. Stromberg recommending a revision to the Biological Goals and Objectives section of the HCP.
April 2008 – May 2008:	The Service sent and received miscellaneous electronic mail messages to a representative from Laurence P. Stromberg regarding the proposed project and revisions to the Habitat Conservation Plan.
May 1, 2008:	The Service received the Phase I Environmental Site Assessment dated June 4, 2007 from a representative from Brelje and Race Consulting.
May 5, 2008:	The Service received a revised Low-Effect Habitat Conservation Plan dated May 5, 2008.
June 20, 2008:	The Service sent an electronic mail message to a representative from Laurence P. Stromberg with final recommended revisions to the draft Low-Effect Habitat Conservation Plan.
June 23, 2008	The Service received a final copy of the Low-Effect HCP.
July 3, 2008:	Availability of the Low-Effect HCP for a 30-day public review was announced in the **Federal Register** (73 **FR** 38244; July 3, 2008).
August 4, 2008:	The 30-day public comment period on the Low-Effect HCP concluded. No comments were received from the public.
August 07, 2008:	Service finalized the Screening Form for Low-Effect HCP Determinations and Environmental Action Statement, and establishes that the HCP for the SCOE Dutton Avenue School qualifies as a "low-effect" HCP that can be categorically excluded from NEPA.

BIOLOGICAL OPINION

Description of the Proposed Action

The proposed Federal discretionary action is the issuance of a section 10(a)(1)(B) incidental take permit (Permit) that addresses one listed animal (California tiger salamander) and one listed plant (Sebastopol meadowfoam) that could be affected by the activities associated with the construction of the Dutton Avenue School in Santa Rosa, Sonoma County, California. The permit will be in effect for five years.

Description of the Proposed Project

The Sonoma County Office of Education has proposed to construct a new community school on 4.42 acres (ac) (1.79 hectares (ha)) in the City of Santa Rosa, Sonoma County, California. The proposed community school will provide an alternative learning environment for 12 to 18-year-old students that encounter difficulties in a traditional school setting and/or exhibit negative behavior patterns in either school or the community at large. The school will include 21,000 square feet (ft^2) (1,951 square meters (m^2)) of buildings, play fields, and attendant facilities. The buildings will include a 1,000 ft^2 (93 m^2) administration building, two large classrooms with a combined area of 6,000 ft^2 (557 m^2), two medium-sized classrooms with a combined area of 3,000 ft^2, five standard classrooms with a combined area of 5,000 ft^2 (465 m^2), and a 5,700 ft^2 (530 m^2) multi-use room. The multi-use room will include a restroom, a kitchen, a stage and assembly area, and an indoor play area. Outdoor Play areas will include two basketball courts and a field that will serve as a combined soccer field-baseball field. Entry access and 25 parking spaces will be provided along with a car pickup-drop off area. The existing residence and warehouse/garage in the northwest quarter of the site will be retained for administrative purposes and to provide storage facilities. Construction is proposed for 2009. The project will result in permanent affects to 4.13 ac (1.67 ha) of California tiger salamander upland dispersal habitat and 0.07 ac (0.03 ha) of Sebastopol meadowfoam habitat and California tiger salamander breeding habitat.

Action Area

The proposed project is located on 4.42 ac (1.79 ha) in the southern half of the Santa Rosa Plain and in the extreme southern limit of the City of Santa Rosa in an area zoned as "General Industrial" and for which the land use designation is "Limited Industrial." The adjacent land to the west and north is rural residential. Land further to the north, to the east, and to the south has been developed as commercial and light industrial. ORCO Construction Supply, CalPly Drywall and Plastering, Storage master Self Storage, Cokas-Diko Warehouse and Outlet, Shook and Waller Construction, and United Rentals all operate businesses on properties along Dutton Avenue to the north, east, and south of the site. The proposed site is ruderal annual grassland with two seasonal wetlands along the north and south property boundaries.

The annual grassland supports a typical array of introduced annual grasses and forbs. Dominant species at the site includes ryegrass (*Lolium perenne*), wild and slender oats (*Avena fatua* and *A. barbata*), ripgut brome (*Bromus diandrus*), soft chess (*Bromus hordeaceus*), wild radish (*Raphanus sativus*), six-weeks fescue (*Vulpia bromoides*), rough cat's ear (*Hypocheris radicata*), several thistle species (*Centaurea calcitrapa* and *Cirsium vulgare*), lamb's quarters (*Chenopodium album*), Harding grass, bull mallow (*Malva nicaeensis*), hare barley (*Hordeum murinum*), and fillarees (*Erodium botrys* and *E. cicutarium*). The dominate wetland vegetation associated with the smaller of the two seasonal wetlands includes ryegrass and Mediterranean barley (*Hordeum marinum gussoneanum*). Subdominant species include bristly oxtongue (*Picris echioides*), curly dock (*Rumex crispus*), and Harding grass (*Phalaris aquatica*) (just becoming established). Vegetation associated with the larger wetland includes common frog-fruit (*Phyla nodiflora*), manna grass (*Glyceria occidentalis*), spiny clotbur (*Xanthium spinosum*), and a non-native willow (*Salix* sp.).

Background

The Santa Rosa Plain is located in central Sonoma County and is characterized by vernal pools, seasonal wetlands, and associated grassland habitat, that support, among other flora and fauna, the endangered California tiger salamander and four endangered plant species: Burke's goldfields, Sonoma sunshine, Sebastopol meadowfoam, and many-flowered navarretia (listed plants). These listed plants grow only in vernal pools and the California tiger salamander uses seasonal wetlands and vernal pools for breeding and metamorphosis, and the surrounding uplands for dispersal, feeding, growth, maturation, and maintenance of the juvenile and adult population (upland habitat). The distribution of Burke's goldfields, Sonoma sunshine, and Sebastopol meadowfoam is confined almost entirely to the Santa Rosa Plain. Many-flowered navarretia occurs mostly outside the Santa Rosa Plain, and its only Sonoma County population is present on the Santa Rosa Plain.

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.

In addition, seasonal wetlands on the Santa Rosa Plain have been heavily impacted through stream channelization, filling and draining of wetlands, livestock grazing, and irrigation (Patterson *et al.* 1994; CH2M Hill 1995; Keeler-Wolf *et al.* 1997; CNDDB 1998). Each of these effects is discussed in more detail under *Reasons for Decline and Threats to Survival* for Burke's goldfields below.

A Programmatic Biological Opinion covering the four listed plants was issued on July 17, 1998 to the U.S Army Corps of Engineers (Corps). On July 22, 2002, the Service listed the Sonoma County distinct population segment of the California tiger salamander as endangered under an emergency basis. The final rule was issued on March 19, 2003. The listing of the California tiger salamander has caused a level of uncertainty for local jurisdictions, landowners, and developers about how the listing would affect their activities. Private and local public interests met with the Service to discuss possible cooperative approaches to protecting the species, while allowing planned land uses to occur within the range of the animal. The result of these discussions was the formation of the Santa Rosa Plain Conservation Strategy Team (Team). The Team included the following members: Service, California Department of Fish and Game (CDFG), Corps, Environmental Protection Agency, North Coast Regional Water Quality Control Board, local governments, the Laguna de Santa Rosa Foundation, the environmental community, and private landowners. It was agreed that the Team would develop a conservation strategy for the Santa Rosa Plain that conserves and enhances the habitat for the California tiger salamander and listed plants, while considering the need for development pursuant to the general plans of the local jurisdictions. The Team held its first meeting on March 30, 2004, and continued to meet through August 2005, to prepare a Draft Santa Rosa Plain Conservation Strategy. The Team held a public meeting on September 12, 2005, and received numerous comments on the draft through September 16, 2005. In addition, the Draft Santa Rosa Plain Conservation Strategy was peer reviewed. The Team reviewed and considered all comments received, made modifications to the Draft Santa Rosa Plain Conservation Strategy where appropriate, and produced the Final Santa Rosa Plain Conservation Strategy (SRPCS).

The SRPCS identifies areas within the Santa Rosa Plain that should be conserved to benefit both the California tiger salamander and listed plants. Designation of an individual property as being within a conservation area does not change that property's land use designation or zoning, or

otherwise restrict the use of that property. In addition, a property in a conservation area is not automatically suitable for listed species conservation.

The purpose of the conservation areas is to insure that preservation occurs throughout the range of the listed species. The designation of conservation areas is based upon the following factors: 1) known distribution of the California tiger salamander; 2) the presence of suitable California tiger salamander habitat; 3) presence of large blocks of natural or restorable land; 4) proximity to existing Preserves; and 5) known location of the listed plants. The designation of conservation areas also generally attempted to avoid future development areas established by the urban growth boundaries and city general plans. Areas that are in the Laguna de Santa Rosa floodplain, areas above approximately 300 ft in elevation and characterized by oak woodland, or are adjacent to or surrounded by significant urban areas, generally have been excluded from the boundaries of the conservation areas, however these areas may still require compensation if endangered species are adversely affected. The Southwest Santa Rosa Preserve System is within the urban growth boundary of the City of Santa Rosa.

The conservation area boundaries identify areas where compensation for project-related adverse affects to listed species should be directed. The listed plants also occur in the identified conservation areas, with the exception of the southwest Cotati and southeast Cotati Conservation Areas. However, the many-flowered navarretia is only known from one site within the Santa Rosa Plain; this area is not located within the proposed project area. Some lands within the conservation areas are excluded based on existing development and on their small size or on other factors that would make them unsuitable for conservation of listed species. Complete descriptions of the conservation areas are is in the SRPCS. The entire SRPCS is available on the Service's web site at: http://www.fws.gov/sacramento/es/santa_rosa_conservation.html

The Service issued a new Programmatic Biological Opinion (Programmatic BO) on November 9, 2007. The new Programmatic BO included permit actions, enforcement actions, and creation/management of mitigation banks that may adversely affect Sonoma sunshine, Burke's goldfields, Sebastopol meadowfoam, and the California tiger salamander (Service 2007). The Programmatic BO did not cover the many-flowered navarretia due to its limited distribution. Projects that may impact sites supporting *B. bakeri* or *L. burkei*, where surveys have documented 2,000 plants or greater in any year in the past 10 years may not be appended to the Programmatic BO, but will be evaluated on a case by case basis. The 2005 Santa Rosa Plain Conservation Strategy was the biological framework upon which the new Programmatic BO was based; the new Programmatic BO replaced the 1998 Programmatic Biological Opinion. This document provides the framework for mitigation, conservation, translocation, and minimization measures. The Service and the U.S. Army Corps of Engineers worked closely during the preparation of 2007 Programmatic.

Conservation Strategy

The conservation strategy for this HCP was developed based on the SRPCS and the *Programmatic Biological Opinion 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)* (Programmatic BO) issued November 9, 2007.

Consistent with the SRPCS and the Programmatic BO, the applicant has agreed to mitigate for the loss of 4.13 ac (1.67 ha) of California tiger salamander upland habitat by purchasing 8.3 credits (a 2 to 1 ratio) at a Service approved mitigation bank or conservation bank (Preserve) located within the Santa Rosa Plain and mitigate for the loss of 0.07 ac (0.03 ha) of meadowfoam habitat by purchasing 0.105 credits (a 1.5 to 1 ratio) at a Preserve also located within the Santa Rosa Plain that will also have occurrences of Burke's goldfields and Sonoma sunshine. The mitigation will assist with the implementation of the SRPCS, by contributing to the following goals of the SRPCS:

1. Establish listed plant preserves to maintain genetic diversity of listed plants throughout their known range on the Plain and maintain in these preserves, at least 10 occurrences of both Sonoma sunshine and Burke's goldfields throughout their known range on the Plain. The Sonoma County Office of Education will acquire credits from a conservation bank in which populations of Sebastopol meadowfoam has been maintained and/or established.

2. Expand the number of secure extant occurrences and established populations of each of the listed plant species: and establish the Preserves in such a manner that they provide interconnected habitat for listed plant species. The Sonoma County Office of Education will acquire credits from a conservation bank which is part of the initial array of sites developed in the SRPCS that will eventually be interconnected.

3. Assure that preservation occurs in proportion to the effect of California tiger salamander and California tiger salamander habitat loss, applying either the interim mitigation requirements until the SRPCS is implemented or the long-term mitigation requirements thereafter, and implementing the California tiger salamander habitat preservation requirements of the SRPCS. The SCOE will mitigate in a manner consistent with the interim mitigation requirements of the SRPCS and will acquire credits from a conservation bank at which California tiger salamander habitat has been preserved and California tiger salamander breeding habitat has been created.

A "Preserve" includes mitigation and conservation banks and other mitigation and conservation sites. Preserve establishment guidance and evaluation criteria are provided in Enclosure 3 of the Programmatic BO and are incorporated into this biological opinion by reference. Enclosure 3 can be accessed at the Service web site identified above. Other required components include management plans, long-term endowments, and other necessary requirements, all of which must

be complete and approved by the Service and CDFG before a Preserve can sell credits for listed species.

Avoidance and Minimization Measures – Listed Species

In addition to the mitigation described above, the Applicant will minimize affects from the proposed project to the California tiger salamander and meadowfoam by implementing the following minimization measures (these measures or similar ones are also identified in the Programmatic BO):

1. A biological monitor will be available to be on-site every day during construction and earthwork. The biological monitor will inform the Service and the California Department of Fish and Game if any California tiger salamanders are encountered and request a location for release. The biological monitor will prepare a report summarizing the entire operation for submittal to the Service and CDFG.

2. A training session will be given by the biologist to all construction workers before work is started on the project. After initial training, all new personnel will be given the training as well. The training session will provide pictures of the California tiger salamander, information on their biology, measures required to protect these species, relevant Federal and state regulations, penalties to harming or harassing the California tiger salamander, and what to do if California tiger salamander is found. If a California tiger salamander is observed on the site by a worker, the worker will immediately inform the biological monitor or biologist. All work will halt and machinery turned off within 100 feet of the animal until a biologist can capture and remove the California tiger salamander from the work area. Service-approved biologists are the only persons allowed to handle California tiger salamander and any California tiger salamanders found in the work area will be relocated to pre-approved locations within one hour of capture.

3. The biological monitor and the biologist will have stop work authority at any time to prevent harming special status species or when any of these protective measures have been violated. Work will only commence when authorized by the biological monitor or biologists.

4. Before the start of work each morning, the monitor will check for animals under any equipment such as vehicles and in stored pipes. The monitor will also check all excavated steep-walled holes or trenches greater than one foot deep for any wildlife. A record of all California tiger salamanders observed and the outcome of that observation will be submitted to the Service.

5. A Storm Water Pollution Prevention Plan will be developed for the proposed. Erosion control will be accomplished using conventional techniques suitable for local conditions (soil type, slope, etc.). Applicable protection measures, such as barrier and/or silt fencing

and regular on-site monitoring, will be used to protect against inadvertent affects to areas outside the project area during construction.

6. Staging and work areas will be limited to the project site only.

7. All foods and food-related trash items, such as lunch bags, plastic sandwich bags, fast food containers, foods of any type, candy wrappers, chip packages, drink bottles and cans, etc., will be enclosed in sealed trash containers and removed completely from the site once every three days.

8. No pets are allowed on the project site during construction.

9. A speed limit of 15 mph will be maintained in the western third of the site.

10. All equipment will be maintained such that there will be no leaks of automotive fluids such as gasoline, oils, or solvents.

11. Hazardous materials such as fuels, oils, solvents, etc., will be stored in sealable containers in a designated location that is at least 200 ft (61 m) from aquatic habitats on the property to the north.

Status of the Species

California Tiger Salamander

Listing

The Sonoma County Distinct Population Segment of the California tiger salamander was emergency listed as endangered on July 22, 2002 (Service 2002). The salamander was listed as endangered on March 19, 2003 (Service 2003). The California tiger salamander was listed as threatened on August 4, 2004 (Service 2004). This latter listing changed the status of the Santa Barbara and Sonoma county populations from endangered to threatened. On August 10, 2004, the Service proposed 47 critical habitat units in 20 counties. No critical habitat was proposed for Sonoma County. On October 13, 2004, a complaint was filed in the U.S. District Court for the Northern District of California (Center for Biological Diversity and Environmental Defense Council v. U.S. Fish and Wildlife Service *et al.*). On February 3, 2005, the District Court required the Service to submit for publication in the **Federal Register**, a final determination on the proposed critical habitat designation on or before December 1, 2005. On August 2, 2005, the Service noticed in the **Federal Register** a proposed critical habitat designation (Service 2005a). On August 19, 2005, a court order was filed on the above complaint, which upheld the section 4(d) rule exempting grazing from Section 9 prohibitions, but vacated the downlisting of the Santa Barbara and Sonoma populations and reinstated their endangered distinct population segment status. On December 14, 2005, (Service 2005b), we made a final determination to

designate and exclude approximately 17,418 acres (7,049 hectares) of critical habitat for the Sonoma population. All of critical habitat was excluded based on interim conservation strategies and measures being implemented by those local governing agencies with land use authority over the area and also as a result of economic exclusions authorized under section 4(b)(2) of the Act. Therefore, no critical habitat was designated for the Sonoma County Distinct Population Segment of the California tiger salamander in Sonoma County, California.

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 (20.83 centimeters) (Petranka 1998). Tiger salamanders exhibit sexual dimorphism with males typically larger than females. The coloration of the California tiger salamander is white or yellowish markings against black. Adult California tiger salamanders usually have creamy yellow to white spotting on the sides and reduced spotting on the dorsal surface of the animal, whereas other tiger salamander species have brighter yellow spotting that is heaviest on the dorsal surface. California tiger salamander 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 cm) (Petranka 1998).

Habitat and Life History

The California tiger salamander has an obligate biphasic life cycle (Shaffer *et al.* 2004). Although larvae salamanders develop in vernal pools and ponds in which they were born, they are otherwise terrestrial salamanders and spend most of their postmetamorphic lives in widely dispersed underground retreats (Shaffer *et al.* 2004; Trenham *et al.* 2001). Although tiger salamanders are members of the Family Ambystomatidae (mole salamanders), also known as "burrowing salamanders," California tiger salamanders are not known to create their own burrows in the wild, which may be due to the hardness of soils in the California ecosystems in which they are found. Subadult and adult California tiger salamanders spend the dry summer and fall months of the year in the burrows of small mammals, such as California ground squirrels (*Spermophilus beecheyi*) and Botta's pocket gopher (*Thomomys bottae*) (Storer 1925; Loredo and Van Vuren 1996; Petranka 1998; Trenham 1998a). Burrows often harbor camel crickets (*Ceuthophilas* spp. and *Pristoceuthophilus* spp.) and other invertebrates that provide likely prey for California tiger salamanders. Underground refugia also provide protection from the sun and wind associated with the dry California climate that can cause excessive drying of amphibian skin. Burrows may be active (in use by small mammals) or inactive (small mammals are absent), but because burrows tend to be short lived without continued small mammal activity, they typically collapse within approximately 18 months if not maintained (Loredo *et al.* 1996). An active population of burrowing mammals is necessary to sustain sufficient underground refugia for the species. California tiger salamanders also may utilize leaf litter or desiccation cracks in the soil. Because they live underground in small mammal burrows, California tiger salamanders are rarely encountered in the uplands by humans even where they are abundant. Recent surveys

performed within the East Bay Regional Parks District (EBRPD) have demonstrated that California tiger salamanders may utilize less than 50% of suitable breeding habitat during any given year. This data indicates that even in ponds where the species appears to have been extirpated, regular breeding activities may still occur (Bobzien and DiDonato 2007)

The upland burrows inhabited by California tiger salamanders have often been referred to as "aestivation" sites, which implies a state of inactivity; however, recent studies show that the animals move, feed, and remain active in their burrows (Trenham 2001; Van Hattem 2004). Researchers have long inferred that they are feeding while underground because the animals arrive at breeding ponds in good condition and are heavier when entering a pond than when leaving. Thus, upland habitat is a more accurate description of the terrestrial areas used by California tiger salamanders.

Once fall or winter rains begin, the salamanders emerge from the upland sites on rainy nights to feed and to migrate to the breeding ponds (Stebbins 1985, 1989; Shaffer *et al.* 1993). Adult salamanders mate in the breeding ponds, after which the females lay their eggs in the water (Twitty 1941; Shaffer *et al.* 1993; Petranka 1998). Historically, California tiger salamanders utilized vernal pools, but the animals also currently breed in livestock ponds. Females attach their eggs singly, or in rare circumstances, in groups of two to four, to twigs, grass stems, vegetation, or debris (Storer 1925; Twitty 1941). In ponds with no or limited vegetation, they may be attached to objects, such as rocks and boards on the bottom (Jennings and Hayes 1994). California tiger salamander populations at eastern San Francisco Bay locations may have higher reproductive success in ponds with limited to no emergent vegetation, potentially due to a reduced number of aquatic predators that rely on more highly shaded areas (Bobzien and DiDonato 2007). After breeding, adults leave the pool and return to the small mammal burrows (Loredo *et al.* 1996; Trenham 1998a), although they may continue to come out nightly for approximately the next two weeks to feed (Shaffer *et al.* 1993). In drought years, the seasonal pools may not form and the adults can not breed (Barry and Shaffer 1994).

California tiger salamander eggs hatch in 2 to 4 weeks (Storer 1925; Shaffer and Trenham 2004). The larvae are aquatic with yellowish gray coloration and have broad fat heads, possess large, feathery external gills, and broad dorsal fins that extend well onto their back. The larvae feed on zooplankton, small crustaceans, and aquatic insects for about six weeks after hatching, after which they switch to larger prey (J. Anderson 1968). Larger larvae have been known to consume the tadpoles of Pacific treefrogs (*Pseudacris regilla*), and California red-legged frogs (*Rana aurora draytonii*) (J. Anderson 1968; P. Anderson 1968). California tiger salamander larvae are among the top aquatic predators in seasonal pool ecosystems. When not feeding, larvae often rest on the bottom in shallow water, but are also found throughout the water column in deeper water. Young salamanders are wary and typically escape into vegetation at the bottom of the pool when approached by potential predators (Storer 1925).

The larval stage of the California tiger salamander usually last three to six months, as most seasonal ponds and pools dry up during the summer (Petranka 1998). The peak emergence of

these metamorphs is typically between mid-June to mid-July (Loredo and Van Vuren 1996; Trenham *et al.* 2000) but in some areas as early as late February or early March. Amphibian larvae must grow to a critical minimum body size before they can metamorphose (change into a different physical form) to the terrestrial stage (Wilbur and Collins 1973). Individuals collected near Stockton in the Central Valley during April varied from 1.88 to 2.32 inches (47.75 to 58.93 mm) in length (Storer 1925). Feaver (1971) found that larvae metamorphosed and left the breeding pools 60 to 94 days after the eggs had been laid, with larvae developing faster in smaller, more rapidly drying pools. The longer the ponding duration, the larger the larvae and metamorphosed juveniles are able to grow, and the more likely they are to survive and reproduce (Pechmann *et al.* 1989; Semlitsch *et al.* 1988; Morey 1998; Trenham 1998b). The larvae will perish if a site dries before metamorphosis is complete (P. Anderson 1968; Feaver 1971). Pechmann *et al.* (1989) found a strong positive correlation with ponding duration and total number of metamorphosing juveniles in five salamander species. In Madera County, California Feaver (1971) found that only 11 of 30 pools sampled supported larval California tiger salamanders, and five of these dried before metamorphosis could occur. Therefore, out of the original 30 pools, only six (20 percent) provided suitable conditions for successful reproduction that year. Size at metamorphosis is positively correlated with stored body fat and survival of juvenile amphibians, and negatively correlated with age at first reproduction (Semlitsch *et al.* 1988; Scott 1994; Morey 1998). In the late spring or early summer, before the ponds dry completely, metamorphosed juveniles leave them and enter upland habitat. This emigration occurs in both wet and dry conditions (Loredo and Van Vuren 1996; Loredo *et al.* 1996). Unlike during their winter migration, the wet conditions when adult California tiger salamanders typically move do not generally occur during the months when their breeding ponds begin to dry. As a result, juveniles may be forced to leave their ponds on rainless nights. Under these conditions, they may move only short distances to find temporary upland sites for the dry summer months, waiting until the next winter's rains to move further into suitable upland refugia. Once juvenile California tiger salamanders leave their birth ponds for upland refugia, they typically do not return to ponds to breed for an average of 4 to 5 years (Trenham *et al.* 2000). However, the minimum age at sexual maturity has been observed to be two years for males and 2 to 3 years for females (Loredo and Van Vuren 1996; Trenham et al. 2000). Individuals remain active in the uplands, coming to the surface during rainfall events to disperse or forage (Trenham and Shaffer 2005).

Lifetime reproductive success for California and other tiger salamanders is low. Trenham *et al.* (2000) found the average female bred 1.4 times and produced 8.5 young that survived to metamorphosis per reproductive effort. This resulted in roughly 11 metamorphic offspring over the lifetime of a female. Two reasons for the low reproductive success are the preliminary data suggests that most individuals of the California tiger salamanders require two years to become sexually mature, but some individuals may be slower to mature (Shaffer *et al.* 1993); and some animals do not breed until they are four to six years old. While individuals may survive for more than ten years, many breed only once, and in some populations, less than 5 percent of marked juveniles survive to become breeding adults (Trenham 1998b). With such low recruitment, isolated populations are susceptible to unusual, randomly occurring natural events as well as

from human caused factors that reduce breeding success and individual survival. Factors that repeatedly lower breeding success in isolated pools can quickly extirpate a population.

Movements made by California tiger salamanders can be grouped into two main categories: (1) breeding migration; and (2) interpond dispersal. Breeding migration is the movement of salamanders to and from a pond from the surrounding upland habitat. After metamorphosis, juveniles move away from breeding ponds into the surrounding uplands, where they live continuously for several years. At a study in Monterey County, it was found that upon reaching sexual maturity, most individuals returned to their natal/ birth pond to breed, while 20 percent dispersed to other ponds (Trenham *et al.* 2001). Following breeding, adult California tiger salamanders return to upland habitats, where they may live for one or more years before breeding again (Trenham *et al.* 2000).

California tiger salamanders are known to travel large distances from breeding sites into upland habitats. Maximum distances moved are generally difficult to establish for any species, but California tiger salamanders in Santa Barbara County have been recorded to disperse 1.3 miles (2.09 km) from breeding ponds (Sweet *in litt.* 1998). California tiger salamanders are known to travel between breeding ponds; one study found that 20 to 25 percent of the individuals captured at one pond were recaptured later at ponds approximately 1,900 and 2,200 feet away (Trenham *et al.* 2001). In addition to traveling long distances during migration to or dispersal from ponds, California tiger salamanders may reside in burrows that are far from ponds. At one site in Contra Costa County, hundreds of California tiger salamanders have been captured three years in a row in upland habitat approximately 0.75 miles from the nearest breeding pond (Orloff 2003).

Although the observations above show that California tiger salamanders can travel far, typically they stay closer to breeding ponds. Evidence suggests that juvenile California tiger salamanders disperse further into upland habitats than adults. A trapping study conducted in Solano County during winter of 2002/2003 found that subadults used upland habitats further from breeding ponds than adults (Trenham and Shaffer 2005). More subadults were captured at distances of 328, 656, and 1,312 feet from breeding ponds than at 164 feet. Large numbers, approximately 20 percent of total captures, were found 1,312 feet from a breeding pond. Fitting a distribution curve to the data revealed that 95 percent of subadults could be found within 2,067 feet (630 meters) of the pond, with the remaining 5 percent being found at even greater distances. Results from the 2003/2004 trapping efforts detected subadult California tiger salamanders at even further distances, with a large proportion of the total salamanders caught at 2,297 feet from the breeding pond (Trenham and Shaffer, 2005). During post-breeding emigration, radio-equipped adult California tiger salamanders were tracked to burrows 62 to 813 feet from their breeding ponds (Trenham 2001). These reduced movements may be due to adult California tiger salamanders having depleted physical reserves post-breeding, or also due to the drier weather conditions that can occur during the period when adults leave the ponds.

In addition, rather than staying in a single burrow, most individuals used several successive burrows at increasing distances from the pond. Although the studies discussed above provide an

approximation of the distances that California tiger salamanders regularly move from their breeding ponds, upland habitat features will drive the details of movements in a particular landscape. Trenham (2001) found that radio-tracked adults favored grasslands with scattered large oaks, over more densely wooded areas. The same study showed no indication that certain habitat types are favored as corridors for terrestrial movements (Trenham 2001). In addition, at two ponds completely encircled by drift fences and pitfall traps, captures of arriving adults and dispersing new metamorphs were distributed roughly evenly around the ponds. Thus, it appears that dispersal into the terrestrial habitat occurs randomly with respect to direction and habitat types.

Several species have either been documented to prey or likely prey upon the California tiger salamanders including coyotes (*Canis latrans*), raccoons (*Procyon lotor*), opossums (*Didelphis virginiana*), egrets (*Egretta species*), great blue herons (*Ardea herodias*), crows (*Corvus brachyrhynchos*), ravens (*Corvus corax*), garter snakes (*Thamnophis* spp), bullfrogs (*Rana catesbeiana*), mosquito fish (*Gambusia affinis*), and crayfish (*Procrambus* spp.). In addition, predacious aquatic hexapods (arthropods) have also been shown to have a significant negative association with California tiger salamanders (Bobzien and DiDonato 2007). Domestic dogs (*Canis familiaris*) have been observed eating California tiger salamanders at Lake Lagunitas at Stanford University (Barry, pers. comm. 2004).

Historical and Current Distribution

Historically, the California tiger salamander inhabited low elevation grassland and oak savanna plant communities of the Central Valley, and adjacent foothills, and the inner Coast Ranges in California (Jennings and Hayes 1994; Storer 1925; Shaffer *et al.* 1993). The species has been recorded from near sea level to approximately 3,900 feet (1,188.7 meters) in the Coast Ranges and to approximately 1,600 feet (487.7 meters) in the Sierra Nevada foothills (Shaffer *et al.* 2004). Along the Coast Ranges, the species occurred from the Santa Rosa area of Sonoma County, south to the vicinity of Buellton in Santa Barbara County. The historic distribution in the Central Valley and surrounding foothills included northern Yolo County southward to northwestern Kern County and northern Tulare County.

The Sonoma County Distinct Population Segment of the California tiger salamander is discrete in relation to the remainder of the species. The population is geographically isolated and separate from other California tiger salamanders. The Sonoma County population is widely separated geographically from the closest populations, which are located in Contra Costa, Yolo, and Solano counties. These populations are separated from the Sonoma County population by the Coast Range, Napa River, and the Carquinez Straits, at a minimum distance of approximately 45 miles (72 kilometers). There are no known records of the California tiger salamander in the intervening areas (D. Warenycia, California Department of Fish and Game, personal communication with the Service, 2002). The Service has no evidence of natural interchange of individuals between the Sonoma County population and other California tiger salamander populations.

The Sonoma County Distinct Population Segment of the California tiger salamander inhabits low-elevation (below 500 feet [152 meters]) vernal pools and seasonal ponds, associated grassland, and oak savannah plant communities. The historic range of the Sonoma County population also may have included the Petaluma River watershed, as there is one historic record of a specimen from the vicinity of Petaluma from the mid-1800s (Borland 1856, as cited in Storer 1925).

2001 to present: Between 2001 and 2002, five breeding sites for Sonoma County Distinct Population Segment of the California tiger salamander were destroyed. Loss of real and potential salamander breeding sites, upland refugia, dispersal, and foraging habitat continues to occur in the Santa Rosa Plain. To date, there have been 22 biological opinions (*i.e.*, section 7 formal consultations) authorizing incidental take to all individuals inhabiting 493.922 acres (199.88 ha) of California tiger salamander habitat since the emergency listing on July 22, 2002. Three of these 22 biological opinions address adverse and beneficial affects associated with the construction of seasonal wetlands and creation of California tiger salamander breeding habitat and establishment of Burke's goldfields, Sebastopol meadowfoam, and Sonoma sunshine. These three sites are the Hazel Mitigation Bank, Wright Preservation Bank, and the Slippery Rock Conservation Bank. Temporary ground disturbance associated with these three banks included approximately 149.06 acres (60.32 ha); therefore there has been 344.22 acres (39.30 ha) of permanent California tiger salamander habitat loss permitted by the Service through section seven consultations. The other 18 biological opinions have integrated in their project proposals to conserve a total of 471.865 acres (190.96 ha) of California tiger salamander habitat at Service approved locations within Sonoma County via the purchase of mitigation or conservation credits, recording conservation easements, or offering fee title to the CDFG or another Service approved entity.

As of October 15, 2007, there are approximately 730 ac (295.42 ha) of *existing* Preserves that support occupied California tiger salamander habitat within conservation areas. Some of these existing preserves also support the listed plants. There are also approximately 165 ac (187 ha) of *pending* Preserves within conservation areas that are anticipated to be protected in perpetuity.

Reasons for Decline and Threats to Survival

The California tiger salamander is imperiled throughout its range by a variety of human activities (Service 2004). Current factors associated with declining populations of the salamander include continued degradation and loss of habitat due to agriculture and urbanization, hybridization with non-native eastern tiger salamanders (*Ambystoma tigrinum*) (Fitzpatrick and Shaffer 2004; Riley *et al.* 2003), and introduced predators. Hybridization with non-native eastern tiger salamanders has not yet been identified within the Sonoma County population. Fragmentation of existing habitat and agricultural activities that degrade and/or eliminate breeding pools may represent the most significant current threats to the Sonoma County Distinct Population Segment of the California tiger salamander, although populations are likely threatened by more than one factor.

Isolation and fragmentation of habitats within many watersheds have precluded dispersal between sub-populations and jeopardized the viability of metapopulations (broadly defined as multiple subpopulations that occasionally exchange individuals through dispersal, and are capable of colonizing or "rescuing" extinct habitat patches). Other threats are predation and competition from introduced exotic species, various chemical contaminants, road-crossing mortality, and certain unrestrictive mosquito and rodent control operations.

Diseases may also pose a significant threat though the specific effects of disease on the California tiger salamander are not known. Pathogens, fungi, water mold, bacteria, and viruses are known to adversely affect other tiger salamander species and/or other amphibians. Pathogens are suspected of causing global amphibian declines (Davidson *et al.* 2003). Pathogen outbreaks have not been documented in the California tiger salamander, but chytrid fungus infections (chytridiomycosis) have been detected in California tiger salamander (Padgett-Flohr and Longcore 2005). Chytridiomycosis and ranaviruses are a potential threat to the California tiger salamander because these diseases have been found to adversely affect other amphibians, including tiger salamanders (Davidson *et al.* 2003; Lips *et al.* 2003). A deformity-causing infection, possibly caused by a parasite in the presence of other factors, has affected pond-breeding amphibians at known tiger salamander breeding sites. This same infection has become widespread among amphibian populations in Minnesota and poses the threat of becoming widespread in California. Nonnative species, such as bullfrogs and nonnative tiger salamanders, are located within the range of the California tiger salamander and have been identified as potential carriers of these diseases. Human activities can facilitate the spread of disease by encouraging the further introduction of non-native carriers and by acting as carriers themselves (i.e. contaminated boots or fishing equipment). Human activities can also introduce stress by other means, such as habitat fragmentation, that results in tiger salamanders being more susceptible to the effects of disease. Disease will likely become a growing threat because of the relatively small and fragmented remaining California tiger salamander breeding sites, the many stresses on these sites due to habitat losses and alterations, and the many other potential disease-enhancing anthropogenic changes that have occurred both inside and outside the species' range.

Burke's Goldfields

Listing History

Burke's goldfields was federally listed as endangered on December 2, 1991 (Service 1991). No critical habitat has been designated for this species.

Description

Burke's goldfields is a slender annual herb in the aster family (Asteraceae). Plants are typically less than 11.8 inches (30 centimeters) in height (Hickman 1993) and usually branched (CNPS 1977). Leaves are narrow and opposite, less than two inches (5 centimeters) in length, may be entire or pinnately lobed, and with or without hairs (Ordnuff 1993). Ray and disk flowers are

yellow. The blooming period is variable depending on annual rainfall, but generally occurs from mid April to mid May, although it is known to bloom as early as mid March and as late as mid-June (CNPS 1977; Patterson *et al.* 1994; Tibor 2001). Inflorescences have separate/free involucre bracts/phyllaries (leaf-like structures beneath the flower head). Achenes (dry, one-seeded fruits) are less than 0.06 inch (1.5 millimeters) in length. The achenes of Burke's goldfields can be distinguished from those of other goldfields by its pappus (parachute like appendage that aids in seed dispersal), which has one long awn (bristle) with several short scales (Ornduff 1969; Ordnuff 1993). Individual Burke's goldfields plants may exhibit some geographic variation in morphology (McCarten 1985 as cited in CH2M Hill 1995; Patterson *et al.* 1994). Patterson *et al.* (1994) report robust specimens from the southern Santa Rosa Plain near the Laguna de Santa Rosa and variation in the number of awns from a Lake County population. Burke's goldfields can be distinguished from smooth goldfields (*Lasthenia glaberrima*) by the partly fused phyllaries of smooth goldfields' and its pappus (ring of scale-like or hair-like projections at the crown of an achene) of numerous narrowed or elliptical scales (Ordnuff 1993). The linear leaves without lobes and typically more than one awn distinguish common goldfields (*Lasthenia californica*) from Burke's goldfields (Ordnuff 1993).

Habitat and Life History

Burke's goldfields grow in vernal pools and swales below 1640 feet (500 meters (m)) (Ordnuff 1993). At the Manning Flat occurrence in Lake County, Burke's goldfields is found in a series of claypan vernal pools on volcanic ash soils (Service 1991; CNDDB 1998). At this location, the species is associated with common goldfields and few-flowered navarretia (*Navarretia leucocephala pauciflora*) (CNDDB 1998). 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 two to three feet (0.6 to 0.9 meters) 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 Santa Rosa Plain (Patterson *et al.* 1994, CNDDB 1998). 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; CNDDB 1998). 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). Burke's goldfields sometimes occurs along with Sonoma sunshine and Sebastopol meadowfoam (*Limnanthes vinculans*). These three federally listed species are all associated with other plants that commonly grow in vernal pools on the Santa Rosa Plain, including Douglas' pogogyne (*Pogogyne douglasii* spp. *parviflora*), Lobb's aquatic buttercup (*Ranunculus lobbii*), smooth goldfields, California semaphore grass (*Pleuropogon californicus*), maroonspot downingia (*Downingia concolor*), and button-celery (*Eryngium sp.*) (CNDDB 1998).

The flowers of Burke's goldfields are self-incompatible (Ornduff 1966; Crawford and Ornduff 1989) and are believed to be insect-pollinated. Specific studies on pollinators of Burke's goldfields have not been conducted; however, evidence suggests that the same insects visit all

outcrossed species of goldfields rather than concentrating on a particular species (Thorp 1976). Insects known to visit the flowers of *Lasthenia* spp. include butterflies (Lepidoptera), beetles (Coleoptera), flies (Diptera), true bugs (Hemiptera), bees, and wasps (Hymenoptera) (Thorp and Leong 1998), most of which are generalist pollinators. All of the specialist pollinators of goldfields are solitary bees (family Andrenidae) (Thorp 1990) that include two species in the subgenus *Diandrena* (*Andrena submoesta* and *A. puthua*) and five or six species in the subgenus *Hesperandrena* (*Andrena baeriae, A. duboisi, A. lativentris*, and two or three undescribed species) (Thorp and Leong 1998). The extent to which pollination of Burke's goldfields depends on host-specific bees or more generalist pollinators is not currently known.

No published information exists with respect to the seed life of Burke's goldfields. Circumstantial evidence suggests that Burke's goldfields has successfully germinated from seed in soil collected from a previously developed portion of the Westwind Business Park (Building F) when the soil was translocated and deposited in created seasonal wetlands (Wilcox *in litt.* 2000). As annual species, it is expected that Burke's goldfields will respond to environmental stochastic events, such as changes in vegetative composition, climate, and disturbance, by partial germination of its seed bank. Seed banks are of particular importance to annual plant species subject to uncertain or variable environmental conditions (Parker *et al.* 1989; Templeton and Levin 1979). Baskin and Baskin (1998) indicate that species (annuals) 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. These characteristics can be attributed to Burke's goldfields. Considering the adaptations of these plants to a variable Mediterranean climate it is likely the seed of Burke's goldfields can persist as dormant embryos for an undetermined number of years. Although formal studies of seed viability have not been conducted for this species, it is reasonable to expect their seed banks may persist for extended periods without germination until conditions are favorable; therefore some occurrences may persist undetected for a number of years. Furthermore, it is not unlikely that the individual fruits of Burke's goldfields may be predisposed to variable germination requirements as a strategy for survival.

According to Rice (1989) in some vegetative communities there is a distinct difference between above and belowground plant diversity and a census of aboveground flora may not accurately reflect the total number of species present at a site. Population sizes of California's vernal pool/swale annual plant species, including Burke's goldfields, may fluctuate substantially between very high numbers in some years to very small numbers, or even absence in other years because of varying environmental conditions. Therefore, extirpation, based on only a few surveys, cannot be assumed based only on absence of above-ground plants for some species. Furthermore, declines in population size over a few years may not necessarily indicate that habitat is unsuitable (Given 1994), merely that environmental conditions within a vernal pool or swale have not favored seed germination.

Historical and Current Distribution

Burke's goldfields are endemic to the central California Coastal Range region and has been reported historically from Mendocino, Lake, and Sonoma counties (CNPS 1977; Patterson *et al.* 1994). The number of historic occurrences (noted as populations and sites in some references) is unclear and has been reported differently by various authors. For several decades, the only reported occurrence was the type locality in Mendocino County, reported in 1886. Ornduff (1969) noted *L. burkei* as known from "several populations" north of San Francisco Bay in the Coast Ranges. Later Ornduff (1976) reported the species was infrequently collected and was "restricted to a few populations." Waaland and Vilms (1989) surveyed 84 sites on the Santa Rosa Plain and noted 33 *L. burkei* occurrences and five additional sites where the species appeared to have been extirpated. CH2MHill (1995) noted 85 populations and cited Patterson *et al.* (1994) as the source. However, while Patterson *et al.* (1994) referenced 85 sites, they noted these sites comprised "approximately 18 biological populations." In 2006, genetic material was collected from 2 occurrences of *L. burkei* in Lake County and 13 in Sonoma County to evaluate the genetic relationship between the occurrences (Ayres and Sloop *in litt.* 2008). The California Natural Diversity Database (CNDDB) (2008) has 32 total occurrences (occurrences 1 – 34). Some CNDDB occurrences are comprised of multiple discreet polygons and may have been counted as separate populations at one time or another, for example occurrence 9 was combined with 7 and 20 was combined with 19. All references in this document to occurrence numbers are CNDDB occurrence number for that species.

The type locality of Burke's goldfields (occurrence 5) is the only known occurrence from Mendocino County, but has not been observed at this location for decades; however, its status is uncertain because the exact location of the site is unclear. Two occurrences are recorded from Lake County, one at Manning Flat (occurrence 6) and one at a winery on Highway 29 (occurrence 11) (Ornduff 1966; CNPS 1977, Patterson *et al.* 1994). Both Lake County occurrences were extant as of 2006 (Ayres and Sloop *in litt.* 2008). According to the CNDDB (2008) the occurrence at Manning Flat had more than 100 individuals in 1999, and an unspecified number in 2002, while the winery occurrence had an estimated 10,000 individuals in 2002. The remaining occurrences are from Sonoma County (CNDDB 2008). Within Sonoma County, one occurrence is known from north of Healdsburg (Patterson *et al.* 1994; CNDDB 2008) near Lytton (occurrence 30). The last known population estimate of this occurrence was in 1990 with 300 plants observed (CNDDB 2008). Formerly well-represented (occurrences 4, 12, and 18) in the vicinity of Windsor, Burke's goldfields has now been nearly extirpated from the area (Patterson *et al.* 1994; CH2M Hill 1995); however, plants have been recently observed at one location (occurrence 12) (Ayres and Sloop *in litt.* 2008). On the Santa Rosa Plain, Burke's goldfields is distributed primarily in the northwestern and central areas with two additional occurrences south of Highway 12 near the Laguna de Santa Rosa (CH2M Hill 1995). The core of the current range of Burke's goldfields is in the Santa Rosa Plain. Of the 32 known occurrences of Burke's goldfields listed in the CNDDB, 28 are presumed to remain extant. Four historical occurrences are believed to be extirpated (occurrences 2-4 and 29), all of which are in Sonoma County. However, Ayres and Sloop (*in litt.* 2008) stated 20 populations were still

extant. Of these 20, 11 are located in conservation banks and 9 are believed to be natural occurrences (C. Sloop Laguna de Santa Rosa Foundation, personal communication 2008). Four of the largest known occurrences are in Sonoma County (occurrences 10, 11, 24, and 25). The largest occurrence is along Alton Road (occurrence 25) and had between 300,000 and 1,500,000 plants in 2002 (CNDDB 2008).

1991 to 1998: Patterson *et al.* (1994) evaluated known Burke's goldfields sites on the Santa Rosa Plain, categorizing them as (1) in public ownership, (2) presumed extant and privately owned, and (3) extirpated or largely destroyed. Their data indicate that 33 percent of the acreage of known Santa Rosa Plain Burke's goldfields sites has been severely degraded or extirpated. As of 1998, the Service was aware of at least a dozen specific instances where ditching, draining, discing, or overgrazing occurred on parcels containing Burke's goldfields. In many cases, the number of plants at those sites declined after the disturbance took place. In addition, the Service was aware of at least four instances of unauthorized discing that triggered Corps enforcement actions for sites where Burke's goldfields grew. Because of typically small parcel size, development projects that have proceeded since listing, such as the Cobblestone and TMD Brown developments, have mitigated Burke's goldfields losses entirely off site. The few sites where plants were avoided in the course of development have failed to sustain viable populations (Service files).

The portion of Burke's goldfields' range that has been most severely affected is the northwestern portion of the Santa Rosa Plain. The majority of the known sites severely degraded or extirpated are in the Windsor area (Patterson *et al.*1994, CH2M Hill 1995). Two of the largest known populations in the county occurred in this area and were considered extirpated by Patterson *et al.* (1994). The extirpations were thought to have resulted from urban and commercial development or agricultural land use changes. For example, one CNDDB occurrence in the area contained 11 colonies in 1984; by 1993, only two were extant (CNDDB 1998). A second occurrence had more than 20 vernal pools in 1985, but by 1994, only one colony of Burke's goldfields was present (CNDDB 1998). This property once contained 50,000 plants, but after repeated discing only about 100 plants remain (Guggolz, pers. comm. 1998). Only a few stable Burke's goldfields sites still exist in the Windsor area, and these are threatened by development (Patterson *et al.* 1994). The City of Windsor has already developed, or designated development, on every Burke's goldfields site within their general planning area (Guggolz pers. comm. 1998).

Since listing in 1991, Burke's goldfields has continued to experience dramatic losses. The Service used data from 1994 (Patterson *et al.* 1994) to examine how numbers of Burke's goldfields changed at particular sites between the time of listing and the most recent surveys that had been conducted after listing. A site, as defined by Patterson *et al.* (1994), may be all or part of a CNDDB occurrence. After listing, the number of sites with many individuals decreased, and the number with very few individuals increased. Fifteen of the 28 sites that we have both pre- and post-listing survey data for decreased in size after the species was listed. The percentage of sites with fewer than 10 individuals increased by 30 percent, and the percentage of sites with 10,000 to 100,000 individuals decreased by 7 percent. As of 1994, no sites were recorded with

more than 100,000 plants. Data from Patterson *et al.* (1994) also indicate that between the time of listing and 1994, 12 different sites were extirpated or largely destroyed. The data indicate large populations of Burke's goldfields are diminishing and nearly half of the sites may have populations either extirpated or are highly vulnerable to extirpation due to small population numbers (less than 10 individuals) (calculated from Patterson *et al.* 1994; CH2M Hill 1995).

Approximately 15 percent of the acreage of Burke's goldfields sites on the Santa Rosa Plain had some preservation designation as of 1994 (calculated from data in Patterson *et al.* 1994). However, the species has not been observed at the Todd Road Preserve (the largest of the preservation sites), since 1987 (Patterson *et al.* 1994, CH2M Hill 1995). Excluding this site, the preserved acreage of Burke's goldfields sites is only 8 percent of the acreage known in 1994 (calculated from data in Patterson *et al.* 1994). Between 1994 and 1998, one preservation bank with Burke's goldfields had been established and was approved to sell credits for the species; however, only a small portion of the site supported Burke's goldfields.

1998 to present: The 1998 programmatic consultation for the listed plants was designed to allow up to 50 acres (20.23 ha) of low-quality seasonal wetlands to be filled and no more than 30 acres (12.14 ha) could be occupied (or presumed to be occupied) by the listed plant species. Of the 30 acres affected that were occupied or presumed occupied, no more than six acres would be on sites with known records of the listed plants. Affects to no more than six additional acres on sites with known records of listed plants may be authorized under the 1998 programmatic consultation at the Service's discretion, based upon the Service's evaluation of the significance of affects to the first six acres of known listed species habitat and/or upon substantial progress toward a comprehensive conservation program. Since 1998, less than 30 acres of low-quality seasonal wetlands were authorized to be filled under the 1998 programmatic consultation. Since 1998, several preservation banks have occurrences of Burke's goldfields, but not all are approved to sell credits for the species.

Reasons for Decline and Threats to Survival

Burke's goldfields are threatened with habitat loss, fragmentation, and degradation throughout all or part of its range by factors including urbanization, agricultural land use changes, alterations in hydrology, wastewater irrigation, and erosion (CNPS 1977; Service 1991; Patterson *et al.* 1994; CH2M Hill 1995; CNDDB 1998). Since the time *L. burkei* was listed in 1991, the species has continued to experience dramatic loss. Patterson *et al.* (1994) evaluated known *L. burkei* sites on the Santa Rosa Plain. Their data indicated that 33 percent of the acreage of known Santa Rosa Plain *L. burkei* sites had been severely degraded or extirpated.

The Service used data from Patterson *et al.* (1994) to examine how numbers of *L. burkei* changed at particular sites between the time of listing and the most recent surveys. A site, as defined by Patterson *et al.* (1994), may be all or part of a CNDDB occurrence. After listing, the number of sites with many individuals decreased, and the number with very few individuals increased. Fifteen of the 28 sites for which there is both pre- and post-listing data decreased in size after the

species was listed. The percentage of sites with fewer than 10 individuals increased by 30 percent, and the percentage of sites with 10,000 to 100,000 individuals decreased by 7 percent. As of 1994, no sites were recorded with more than 100,000 plants. Data from Patterson *et al.* (1994) also indicate that between the time of listing and 1994, 12 different sites were extirpated or largely destroyed. The data indicate large populations of *L. burkei* are diminishing and nearly half of the sites may have populations either extirpated or are highly vulnerable to extirpation due to small population numbers (less than 10 individuals) (calculated from Patterson *et al.* 1994; CH2M Hill 1995).

The only known Mendocino County occurrence is presumably extirpated (CH2M Hill 1995). The Manning Flat occurrence, located on private land in Lake County, historically was the largest known occurrence of the species although it has been decreasing in recent years. The site is threatened by extensive gully erosion (CH2M Hill 1995; CNDDB 2008) as well as road improvements and herbicide use (CNDDB 2008). The second Lake County occurrence is on property owned by a winery. Recent reports suggest that some damage to this population has resulted from vineyard operations (Chan pers. comm. 1998). However, in the past the winery owners appeared willing to coordinate with the Service and the U.S. Army Corps of Engineers to avoid and/or minimize further damage to the site (Haley pers. comm. 1998). On the Santa Rosa Plain, many Burke's goldfields locations (entire or portions of entire occurrences) have been destroyed due to urbanization and conversion of land to row crops.

Urban Development and Conversion to Agriculture: The most severely impacted portion of the range of *Lasthenia burkei* has been the northwestern portion of the Santa Rosa Plain. The majority of the known sites severely degraded or extirpated are in the Windsor area (Patterson *et al.*1994, CH2M Hill 1995). Two of the largest known populations in Sonoma County occurred in this area and were considered extirpated by Patterson *et al.* (1994). The extirpations were thought to have resulted from urban and commercial development or agricultural land use changes. For example, one CNDDB occurrence in the area contained 11 colonies in 1984; by 1993, only two were extant (CNDDB 1998). A second occurrence had more than 20 vernal pools in 1985, but by 1994, only one colony of *L. burkei* was present (CNDDB 1998). This property once contained 50,000 plants, but after repeated disking only about 100 plants remain (Guggolz pers. comm. 1998). Only a few stable *L. burkei* sites still exist in the Windsor area, and these are threatened by development (Patterson *et al.* 1994). The City of Windsor has already developed, or designated development, on every *L. burkei* site within their general planning area (B. Guggolz, 1998 pers. comm.). Only a few stable *L. burkei* sites still exist in the Windsor area, and these are threatened by development (Patterson *et al.* 1994). Development in the Windsor area continues to impact the limited amount of remaining *L. burkei* habitat in this area (Chamberlin pers. comm. 2008).

The population of California is expected to increase to 58 million, almost double the 1990 State population, by 2040 (Field *et al.* 1999). Between 1994 and 2005, the Sacramento FWS office engaged in Section 7 consultations for projects with impacts to approximately 20,250 hectares (50,000 acres) of vernal pool habitat, including the loss of 10,125 hectares (25,000 acres) to

residential, commercial, and industrial development (Service 2005c). The Cities of Santa Rosa, Cotati, and Rohnert Park assisted in the preparation of the Santa Rosa Plain Conservation Strategy (2005) and identified the areas expected to be proposed for development by the year 2015. The threat of urban development to these species in the Santa Rosa Plain is expected to continue in the foreseeable future (Conservation Strategy Team 2005).

Alteration of Hydrology: Vernal pool plants are sensitive to changes in the timing and length period of vernal pool inundations (Bauder 2000). Alteration of the hydrological regime as a result of breaking the clay hard pan (e.g., disking or deep ripping) and draining the pools can change the composition of plant species by invasion of non-native upland species. Conversely, if water from urban or agricultural run-off continues to fill pools during spring and summer months, invasion by plant species adapted to permanent inundation can be expected. Disking appears to be a common activity for fire prevention. Some sites are disked in entirety and others only the perimeter (V. Griego. Service, personal observation, 2003 - 2007). Regular disking has resulted in "smearing" (flattening the landscape) and change the natural hydrology of the area. Some land owners purposefully changed the hydrology to 'get rid' of the listed plants (Chamberlin pers. comm. 2008b). In addition, the hydrology of the seasonal wetland habitat of these plants in many areas throughout the Santa Rosa Plain has been altered by human activity. This resulted in the loss of hydrologic connectivity to neighboring wetlands, to an extent that conditions may not be suitable for germination and flowering in many years. However, the plants can still persist in the seedbank and have been known to "reappear" once more appropriate hydrologic conditions are reestablished (Rosburg 2001; Kavilaan *et al.* 1981).

Changes to vernal pool habitat associated with residential development include facilitation of the introduction of non-native plants to vernal pool habitats (Service 2007). Non-native grasses occur commonly in vernal pool complexes and have become a threat to native vernal pool plants through their capacity to change pool hydrology and competition with native plants. Non-native grasses maintain dominance at pool edges, sequestering light and soil moisture, promoting thatch build-up, and shortening inundations periods. Although the mechanism responsible for the change in inundation is not documented, reduction in inundation period is thought to be due to increased evapo-transpiration at the vernal pools (Marty 2005).

Wastewater Irrigation: Wastewater irrigation is a recently established factor affecting vernal pools on the Santa Rosa Plain. This practice began in the 1970s and has continued which has resulted in changing seasonal wetland plant composition. 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). A 1996 draft Environmental Impact Report (EIR) addressed a proposed long-term wastewater project that would dispose of wastewater from the Laguna Wastewater Treatment Plant by irrigating fields on the Santa Rosa Plain (City of Santa Rosa 1996). The draft EIR stated that wastewater irrigation would avoid impacts to sensitive biological resources. However, in February of 1998, the site supporting many-flowered navarretia had a sign stating wastewater was being used for irrigation on-site (Service 2007). Patterson *et al.* (1994) stated

that the ongoing need to expand effluent irrigation acreage to keep pace with population growth will continue to jeopardize the existence of oak woodlands and vernal pools on the Santa Rosa Plain unless other, less sensitive lands are found for irrigation or other means of disposal are found. The City of Santa Rosa has recently developed an EIR to look at additional wastewater storage and irrigation in the Santa Rosa Plain. The City of Santa Rosa is pursuing agreements with other wastewater facilities (Sonoma County Water Agency and Town of Windsor) to share irrigation and storage. The City of Santa Rosa is permitted to apply wastewater biosolids to lands within the Santa Rosa Plains. The California Regional Water Quality Control Board recently issued a renewed permit to Santa Rosa for wastewater discharges. The permit requires the City of Santa Rosa to study wastewater land application rates to ensure they are not over-irrigating. The permit recognized specific pollutants (including toxic pollutants) in the treated wastewater. The permit sets time schedules for these pollutants to be addressed prior to discharge to surface waters. Technically, the California Regional Water Quality Control Board regulations (Water Quality Control Plan for the North Coast Region) prohibit wastewater discharge to surface waters during the summer. The regulations however do not contemplate that wastewater would be used to irrigate vernal pools and other types of seasonal wetlands (Service 2007). Unchecked wastewater irrigation may alter the normal hydrology of vernal pools in the Santa Rosa Plain and adversely affect *B. bakeri, L. burkei*, and *L. vinculans*.

Off Highway Vehicles: The use of off highway vehicles continues to degrade some vernal pool habitat in the Santa Rosa Plain. For example, there is one location where motocross tracks were created for recreation. There was one incidence where a vehicle entered private property, drove through a population of Blennosperma bakeri, and became stuck. At another location, a locked gate was broken into at a California Department of Fish and Game Preserve that is protected for these species. It is reasonable to expect activities of this sort to increase as urban development and rural development continue to increase. The level of this threat is likely to be variable and is difficult to predict.

Sonoma Sunshine

Listing History

Sonoma sunshine was federally listed as endangered on December 2, 1991 (Service 1991). No critical habitat has been designated for this species.

Description

Sonoma sunshine is a small annual herb in the aster family. Plants are usually less than 11.8 inches (30 centimeters) tall with alternate, linear leaves (CNPS 1977; Ordnuff 1993). The stems are hollow and somewhat fleshy, varying from 0.08 to 0.24 inches (2 to 6 millimeters) in diameter. The lower leaves are entire, and the upper leaves have one to three lobes that are 0.4 to 1.2 inches (1 to 3 centimeters) deep (Ordnuff 1993). The yellow disk flowers have white pollen and stigmas, while the sterile ray flowers are yellow or sometimes white, with red stigmas. The

lobe pattern of the leaves and the color of ray stigmas separate this species from others in the genus. Although the disk flowers in Sonoma sunshine have pistils, they do not produce achenes. However, each ray flower produces one tapered achenes 0.1 to 0.15 inches (3 to 4 millimeters) long with small rounded or conic protuberances (papillate) and 4 to 6 strongly angled edges (CNPS 1977, Ordnuff 1993). *Blennosperma bakeri* grows in vernal pools and wet grasslands below 100 meters (330 feet) (Hickman 1993). *Blennosperma bakeri* occurs in vernal pools on nearly level to slightly sloping loams, clay loams, and clays. The flowers of *B. bakeri* are self-incompatible, meaning that they can set seed only when fertilized by pollen from a different plant.

Habitat and Life History

Sonoma sunshine grows in vernal pools and wet grasslands below 100 m (330 ft) (Hickman 1993). In the Sonoma and Cotati valleys, Sonoma sunshine occurs in vernal pools on nearly level to slightly sloping loams, clay loams, and clays (Service 1991). The two concentrations of Sonoma sunshine on the Santa Rosa Plain occur on different soil types (Patterson *et al.* 1994). Sonoma sunshine likely grows on Huichica loam north of Highway 12 and on Wright loam and Clear Lake clay south of Highway 12 (Patterson *et al.* 1994, CNDDB 1998). These soil series are briefly described in the discussion of Burke's goldfields habitat above.

Sonoma sunshine flowers from March to April. According to Thorp (1976) *Andrena blennospermatis* is the primary visitor to Sonoma sunshine and *Andrena layiae* is known to collect pollen from other species of *Blennosperma*. In addition, few generalist insects are associated with species of Blennosperma as compared to Lasthenia (Thorp 1976). The extent to which pollination of Sonoma sunshine depends on host-specific bees or more generalist pollinators is not currently known. Some generalist insects known to visit the flowers of Blennosperma include other bees (Halictidae and Megachilidae), flies (Syrphidae and Bombyliidae), and beetles (Dermestidae, Dasytidae, and Meloidae).

As noted above under Burke's goldfield, seed banks are believed to be of particular importance in annual species subject to uncertain or variable environmental conditions. As with Burke's goldfield, Sonoma sunshine fit these criteria, since they are annual species (Hickman 1993) living in an uncertain vernal pool environment (Holland and Jain 1977). In the absence of data to suggest otherwise, the presence of substantial seed banks for these species is a reasonable assumption.

Historical and Current Distribution

For nearly 20 years, the only known occurrence (CNDDB occurrence 3) of Sonoma sunshine was the type locality first described in 1946 within the City of Sonoma, Sonoma County, California (Ornduff 1963). In 1963, a second occurrence (occurrence 2) was discovered a few miles south of the first (Ornduff 1963). Both of these first two occurrences were outside of the Santa Rosa Plain but within the Sonoma Valley. The first occurrence within the Santa Rosa Plan

was discovered in 1974 (Patterson *et al.* 1994). On the Santa Rosa Plain the species ranges from near the community of Fulton in the north to Scenic Avenue between the Cities of Santa Rosa and Cotati in the south. Additionally, the species extends or extended from near Glen Ellen to near the junction of State Routes 116 and 121 in the Sonoma Valley.

As with *L. burkei*, the number of historical occurrences (populations and sites in some reports) of Sonoma sunshine has varied depending on author. Waaland and Vilms (1989) reported 30 extant sites with Sonoma sunshine and three extirpated sites. Patterson *et al.* (1994) estimated there were 60 historical populations on separate properties, but that many were hydraulically connected and less than 12 were biologically separate populations. The Service (1991) reported Sonoma sunshine from no more than 42 sites, 35 in the Cotati Valley (locally referred to as the Santa Rosa Plain) and 7 in the Sonoma Valley. The CNDDB (2008) lists 26 occurrences of Sonoma sunshine with three known to be extirpated (occurrences 2, 3, and 18) and one listed as possibly extirpated (occurrence 13). However, Ayres and Sloop (*in litt.* 2008) observed at least 35 plants at the Horn Mitigation bank, which may have encompassed part of occurrence 18. According to Sloop (C. Sloop Laguna de Santa Rosa Foundation, personal communication 2008) there are 23 extant Sonoma sunshine sites, although she was only able to sample 10 (Ayres and Sloop *in litt.* 2008). The Service is aware of four occurrences not listed in the CNDDB, two of which are in close proximity to existing occurrences 30 and 25 and may not be separate. The other two occurrences are not located near any known record and may represent previously undocumented occurrences. One is immediately northwest of the City of Windsor (Ayres and Sloop *in litt.* 2008) and the second is in the vicinity of the City of Shiloh. Of the 26 CNDDB occurrences, 22 are presumed to be extant with a majority occurring on the Santa Rosa Plain, one occurring near the City of Glen Ellen (occurrence 5), and two south of the City of Sonoma (occurrence 16 and 22). In addition, Sonoma sunshine has been introduced to at least five sites including Alton Lane Mitigation Site, Slippery Rock Conservation Bank, Woodbridge Mitigation Site, Hazel Mitigation Bank, and Carinalli-Todd Mitigation Bank (V Griego pers. comm. 2008).

1991 to 1998: Patterson *et al.* (1994) estimated less than 12 biologically separate populations remain. Of the sites they examined, 17 percent (nearly one-third) had been extirpated, and 17 percent (nearly one-sixth) had not been confirmed recently. An additional 17 percent (one-sixth) were believed to be extant but threatened by development as of 1994 (Patterson *et al.* 1994). A site, as defined by Patterson *et al.* (1994), may be all or part of a CNDDB occurrence. At one CNDDB occurrence, 12 Sonoma sunshine colonies were observed in 1989. By 1993, only six remained (CNDDB 1998). The Service is aware of at least five specific Sonoma sunshine sites that have been developed or isolated by surrounding development or vineyards on the Santa Rosa Plain since the time of listing, including the Cobblestone and TMD Brown developments. Other sites have been used as wastewater irrigated pastures, damaged by off road vehicle (ORV) use, heavily grazed, or been subject to land conversion activities (CNDDB 1998, Service files). In addition, Sonoma sunshine is known from at least one of the Burke's goldfield sites mentioned above that were disced without authorization and resulted in enforcement actions being taken by the Corp's (Service files).

The Service used data from 1994 (Patterson *et al.* 1994) to examine how numbers of Sonoma sunshine changed at particular sites between the time of listing and the most recent surveys that had been conducted after listing. After listing, the number of sites with many individuals decreased, and the number with less than 10 individuals increased. The percentage of sites with fewer than 10 individuals increased by 15 percent between the time of listing and 1994.

Approximately 8 percent of the acreage of Sonoma sunshine sites known from the Santa Rosa Plain had some protection as of 1994 (calculated from data in Patterson *et al.* 1994). Of the 120 acres designated as preserve (excludes areas under conservation easement), the amount of habitat containing the species is estimated to be only 2 acres (Guggolz 1995 as cited in CH2M Hill 1995). Between 1994 and 1998, one preservation bank authorized to sell Sonoma sunshine credits had been established, but only 15 individual plants have been observed in recent surveys at the site (Waaland pers. comm. 1998).

1998 to present: The 1998 programmatic consultation was designed to allow up to 50 acres of low-quality seasonal wetlands to be filled and no more than 30 acres could be occupied (or presumed to be occupied) by the listed plant species. Of the 30 affected acres that are occupied or presumed occupied, no more than six acres would be on sites for which there are known records of the listed plants. Affects to no more than six additional acres on sites for which there are known records of listed plants may be authorized under the 1998 programmatic consultation at the Service's discretion, based upon the Service's evaluation of the significance of affects to the first six acres of known listed species habitat and / or upon substantial progress toward a comprehensive conservation program. Between the period of the 1998 programmatic consultation and the November 7, 2007 Programmatic BO, less than 30 acres of low-quality seasonal wetlands were authorized to be filled under the 1998 programmatic. At this time, it is unknown how many of the 30 acres filled were occupied with one or more of the listed plants. The low-quality seasonal wetlands were to be mitigated for with preservation and creation of listed plant habitat as outlined in the 1998 programmatic.

Reasons for Decline and Threats to Survival

Sonoma sunshine is threatened with habitat loss, fragmentation, and degradation throughout all or part of its range by urbanization, waste water irrigation, agricultural land use changes, and alterations in hydrology (Patterson *et al.* 1994; CH2M Hill 1995; CNDDB 2008). These threats are more fully explained above for Burke's goldfields. The type locality (occurrence 3) was extirpated in the 1980s by residential development and conversation of part of the site to vineyards (CNDDB 2008). Occurrence 2, was extirpated in 1986 by activities associated with a vineyard (CNDDB 2008). Occurrence 18, was extirpated as a result of several factors including mowing, disking, alteration in hydrology, and development (CNDDB 2008). A fourth occurrence (13) listed in the CNDDB as possibly extirpated is described as having no remaining suitable habitat as a result of the construction of a residential subdivision (CNDDB 2008) and no individual plants have been observed at this site since 1990. Of the presumed extant Sonoma Valley occurrences (16 and 22) one occurrence was largely destroyed in 1989, but new vernal

pools were created and some plants were observed in 1995 (CNDDB 2008). Occurrence 5, in the Sonoma Valley Regional Park, while protected is not managed specifically for conservation (CNDDB 2008); this site had an estimated 25,000 plants in 1991 (CNDDB 2008) and at least 35 plants were present in 2006 (Ayres and Sloop *in litt.* 2008). Occurrences 7 and 8 are both irrigated by waste water (CNDDB 2008) and maybe suffering from invasion by non-native vegetation. A second Sonoma Valley locale is currently used as a pasture. A portion of the occurrence may have been disked, and the landowners of a second portion want to convert the locale to vineyard (Wilcox pers. comm. 1998). The third Sonoma Valley occurrence is in Sonoma Valley Regional Park, which is not managed for conservation (CNDDB 2008). On the Santa Rosa Plain, one locale has probably been extirpated by completion of a subdivision and one locale by major land alterations on the locale (CNDDB 2008). Of the presumed extant locales, some support severely degraded habitat, are threatened by development, or have not supported confirmed populations of Sonoma sunshine in recent years (CH2M Hill 1995; CNDDB 2008).

The Service used data from 1994 (Patterson *et al.* 1994) to examine how numbers of *B. bakeri* plants at particular sites changed between the time of listing and the most current surveys that had been performed after listing. After listing, the number of sites with many individuals decreased, and the number with less than 10 individuals increased and the percentage of sites with fewer than 10 individuals increased by 15 percent between the time of listing and 1994.

Sebastopol Meadowfoam

Listing History

Sebastopol meadowfoam was federally listed as endangered on December 2, 1991 (Service 1991). No critical habitat has been designated for this species.

Description

Sebastopol meadowfoam is a small multi-stemmed herb in the false meadowfoam family (Limnanthaceae). Plants are usually less than 11.8 inches (30 centimeters) in height with weak, somewhat fleshy, decumbent stems. Although the first leaves are narrow and undivided, leaves on the mature plant have three to five narrow unlobed leaflets with rounded tips along each side of a long stalk (petiole). The shape of the leaves distinguishes *L. vinculans* from other members of the *Limnanthes* genus. Small, bell or dish-shaped, white flowers appear April through May. The fragrant white flowers are born singly at the end of stems. The seeds of *L. vinculans* 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. This species 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 2008).

Habitat Life History

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 (Patterson *et al.* 1994). Each plant can produce up to 100 nutlets (a small dry one-seeded fruit) (Patterson *et al.* 1994).

Nutlets of Sebastopol meadowfoam likely remain dormant in the soil, as they do for other species of *Limnanthes* (Patterson *et al.* 1994). One case presents strong circumstantial evidence for persistent, long-lived seed banks in this species. In the late 1980's and early 1990's, a site in Cotati remote from other Sebastopol meadowfoam colonies was surveyed for several years by independent qualified botanists. None of these botanists identified flowering populations 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 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. The population expanded rapidly to 60 plants the next year and was larger in subsequent years (Service 2007), all limited to one pool. Long-distance dispersal is an improbable explanation for the simultaneous emergence of multiple plants at one location, so seed banks are implicated in this case as well. This example also indicates that lack of Sebastopol meadowfoam during periods of adverse conditions (drought, heavy disturbance, etc.) does not necessarily mean the population is extirpated.

This species 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 2008). The surrounding plant communities range from oak savanna, grassland, and marsh in Sonoma County to riparian woodland in Napa County (CNDDB 2008). Sebastopol meadowfoam grows in both shallow and deep areas, but is most frequent in pools 10 to 20 inches (25 to 51 centimeters) deep (Patterson *et al.* 1994). The species is most abundant in the margin habitat at the edge of vernal pools or swales (Service 2007). 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 2008). 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).

Historical and Current Distribution

As with *L. burkei* and *B. bakeri* the number of historical occurrences (populations and sites in some reports) of Sebastopol meadowfoam have varied depending on author. Patterson *et al.* (1994) states that in 1980 populations of *L. vinculans* were known from 17 locations. By 1994,

the species was known from 55 individually owned parcels, but the number of individual populations was estimated to be 10 (Patterson *et al.* 1994). According to the CNDDB (2008) there are a total of 39 historical occurrences. In the past more occurrences were noted in the CNDDB, but many have since been combined into a single occurrence. Occurrence 5 includes 8, 32, and 41, occurrence 1 includes 4, 11, 19, 37, and 44, occurrence 12 includes 13, occurrence 21 includes 45, and occurrence 28 includes part of 18. Thirty-eight occurrences are known from Sonoma County and one occurrence (occurrence 39) in Napa County, at the Napa River Ecological Reserve. In Sonoma County, all but two occurrences were found in the central and southern portions of the Santa Rosa Plain. Occurrence 20 occurred at Atascadero Creek Marsh west of Sebastopol, and occurrence 40 in the vicinity of Knights Valley northeast of Windsor (CNDDB 2008).

The current condition of numerous Sebastopol meadowfoam occurrences is unclear, because many have not been visited in almost a decade. As indicated above, Patterson *et al.* (1994) estimated only 10 hydrologically separate populations of *L. vinculans*. A site, as defined by Patterson *et al.* (1994), may be all or part of a CNDDB occurrence. Of the 55 sites they examined, four sites (7 percent) were considered erroneous, 10 sites (18 percent) were extirpated, 10 sites (18 percent) were extant but threatened by development, and 20 sites (36 percent) were extant but may not have been large enough to qualify as good preserve lands (Patterson *et al.* 1994). Out of the 39 occurrences currently listed in the CNDDB four sites (10 percent) are identified as extirpated and two additional sites (5 percent) listed as possibly extirpated. In 2006, genetic samples were taken from 21 locations with *L. vinculans*, 20 on the Santa Rosa Plain and one (occurrence 39) from Napa County (Ayres and Sloop *in litt.* 2008). Of the 21 sites sampled, 13 correspond to extant CNDDB occurrences. One corresponded to occurrence 12, which was believed to be extirpated (CNDDB 2008) and one site was an entirely new occurrence.
1991 to 1998: Patterson *et al.* (1994) estimated only 10 hydrologically separate populations of Sebastopol meadowfoam exist. Of the sites they examined, nearly 10 percent were considered erroneous, 18 percent were extirpated, 18 percent were extant but threatened by development, and 36 percent were extant but may not be large enough to qualify as high-quality preserve lands (Patterson *et al.* 1994). A site, as defined by Patterson *et al.* (1994), may be all or part of a CNDDB occurrence. According to Service records, significant Sebastopol meadowfoam sites are within southwest Santa Rosa. Other sites have been extensively fragmented by development, leaving parts of larger vernal pool complexes interspersed with homes. Repeated discing and land conversion activities have damaged some sites as well (Service files).

Excluding easements, eight Sebastopol meadowfoam sites comprising approximately 170 acres were preserved as of 1994 (Patterson *et al.* 1994). However, only a small portion of this acreage is considered actual Sebastopol meadowfoam habitat (CH2M Hill 1995). These eight sites comprised approximately 11 percent of the acreage of Sebastopol meadowfoam sites known from the Santa Rosa Plain in 1994 (calculated from data in Patterson *et al.* 1994). Between 1994 and 1998, two preservation banks with Sebastopol meadowfoam had been established and were authorized to sell credits for this species.

1998 to present: The 1998 programmatic consultation was designed to allow up to 50 acres of low-quality seasonal wetlands to be filled and no more than 30 acres could be occupied (or presumed to be occupied) by the listed plant species. Of the 30 acres affected that were occupied or presumed occupied, no more than six acres would be on sites with known records of the listed plants. Affects to no more than six additional acres on sites with known records of listed plants may be authorized under the 1998 programmatic consultation at the Service's discretion, based upon the Service's evaluation of the significance of affects to the first six acres of known listed species habitat and / or upon substantial progress toward a comprehensive conservation program. Between the period of the 1998 programmatic consultation and the November 7, 2007 Programmatic BO, less than 30 acres of low-quality seasonal wetlands were authorized to be filled under the 1998 programmatic. At this time, it is unknown how many of the 30 acres were occupied with one or more of the listed plants. The low-quality seasonal wetlands were to be mitigated for with preservation and creation of listed plant habitat as outlined in the 1998 programmatic.

Reasons for Decline and Threats to Survival

Sebastopol meadowfoam is threatened with habitat loss, fragmentation, and degradation throughout all or part of its range by urbanization, waste water irrigation, agricultural land use changes, small population size, and alterations in hydrology (Patterson *et al.* 1994; CH2M Hill 1995; CNDDB 2008). These threats are more fully explained above for Burke's goldfields. As with Burke's goldfields and Sonoma sunshine, causes of habitat loss include agricultural conversion, urbanization, and road maintenance. Habitat degradation is caused by excessive grazing by livestock, alterations in hydrology, and competition from non-native species (in some cases, exacerbated by removal of grazing), off-highway vehicle use, and dumping (Service 1991; Patterson *et al.* 1994; CH2M Hill 1995; CNDDB 2008).

Preserves

A "Preserve" includes mitigation and conservation banks and other mitigation and conservation sites. Parcels proposed for preservation under the Programmatic BO provide habitat for the California tiger salamander and/or listed plants. Preserve applications are evaluated by the Service and CDFG to determine its suitability. There are general and species specific Preserve criteria. General Preserve establishment guidance and evaluation criteria are:

1. The site must be preserved in perpetuity for the benefit of the affected species through dedication of fee title or a conservation easement to an appropriate resource management agency or organization.

2. The site must have a habitat enhancement plan, if California tiger salamander and/or listed plant habitat is to be created, restored or established on the site.

3. The site must have a management and monitoring plan including management actions necessary to manage, enhance, and protect the resources protected and created on the site, and monitoring actions to determine the success of created or restored wetlands and the status of the protected resources and effectiveness of specified management actions.

4. The site must have a Service and CDFG – approved funding mechanism to assure long-term management and monitoring.

Species specific criteria for California tiger salamander are:

1. Be within the boundary of one of the Conservation Areas designated by the Conservation Strategy, unless otherwise approved by the Service and CDFG.

2. Contain known, occupied California tiger salamander breeding, upland, or dispersal habitat; or represent potential California tiger salamander habitat. With respect to potential California tiger salamander habitat, the site must exhibit, in the judgment of the Service and CDFG, reasonable potential for habitat restoration or enhancement. Preserves must ultimately have the listed species present within a reasonable time frame.

3. Be free of excessive land surface features such as roads, parking lots, other hardened surfaces, buildings or other structures, or extensive hardscape that cause a significant portion of the site to be unsuitable as California tiger salamander habitat. Generally, for purposes of this criterion, no more than 15% of the land surface of any potential preserve site may include or be covered by such features unless it is to be restored as part of the preservation action.

4. Not isolated from other nearby California tiger salamander habitats (preserve or non-preserve) by incompatible land uses (e.g., hardscape) or other significant barriers to California tiger salamander movement and dispersal, such as Highway 101.

5. Not inhabited by fish and bullfrogs or other non-native predatory species, unless, in the judgment of the Service and CDFG, such species can be effectively removed or eradicated.

6. Not within the Laguna de Santa Rosa 100-year floodplain.

7. Exhibit no history or evidence of the presence (storage or use) of hazardous materials on the surface of the site unless proof of removal or remediation can be provided.

Species specific criteria for Burke's Goldfields, Sonoma sunshine, and Sebastopol meadowfoam are:

(1) Preservation of the listed plant species in appropriate locations within the Plain, as

previously described in *Plant Mitigation and Establishment* section of the *Description of the Proposed Action.*

(2) Contain known population(s) of listed plants or represent potential plant habitat. With respect to potential plant habitat, the site must exhibit, in the judgment of the Service and CDFG, reasonable potential for habitat restoration, and establishment of listed plant population(s).

(3) Be free of excessive land surface features such as roads, parking lots, other hardened surfaces, buildings or other structures, or extensive hardscape that cause a significant portion of the site to be unsuitable as plant habitat. Generally, for purposes of this criterion, no more than 15% of the land surface of any potential preserve site may include or be covered by such features unless it is to be restored as part of the preservation action.

(4) If establishing populations of Sebastopol meadowfoam, the location is to be located south of Santa Rosa Creek. If establishing populations of Sonoma sunshine and/or Burke's goldfields, the location is to be north of the Laguna de Santa Rosa.

(5) Plant preserves should be a minimum of ten acres. Smaller plant preserves may be established to protect extant populations of Sonoma sunshine and Burke's goldfield, where the site characteristics would assure long-term viability or there is an opportunity to protect important population of these two species.

(6) From a management perspective, preserves should include the entire watershed of the pool(s) and swale(s) being protected, and the ratio of perimeter to area should be minimized.

(7) In general, establishment of plant population(s) should not occur in areas where preservation of any natural population(s) occur unless it can be demonstrated that no adverse effects would occur to the natural population(s) as a result of establishing plant populations.

Other required mitigation components include management plans, long-term endowments, and other necessary requirements, all of which must be complete and approved by the Service and CDFG. Preserve enhancement or management associated with permits and enforcement actions that are appended to the Programmatic BO will be provided individual take authorization. It is anticipated that ground work associated with enhancing a Preserve will generally have a net benefit to the California tiger salamander and/or listed plants and would not need to adhere to the mitigation ratios.

Recovery Actions – Listed Species

The purpose of the SRPCS is threefold: (1) to establish a long-term conservation program sufficient to compensate for the potential adverse effects of future development on the Santa Rosa Plain, and to conserve and contribute to the recovery of the California tiger salamander and four listed plants (Sonoma sunshine, Burke's goldfields, Sebastopol meadowfoam, and many-flowered navarretia) and the conservation of their habitats; (2) to accomplish the preceding in a fashion that protects stakeholders' (both public and private) land use interests, and (3) to support issuance of an authorization for incidental take of California tiger salamanders that may occur in the course of carrying out a broad range of activities on the Santa Rosa Plain. The SRPCS will not preserve the species unless implemented by the appropriate agencies. The SRPCS provides the biological basis for a permitting process for projects that are in the potential range of listed species on the Santa Rosa Plain. This is intended to provide consistency, timeliness, and certainty for permitted activities. The SRPCS study area is comprised of the potential California tiger salamander range and the listed plant range within the Santa Rosa Plain. The SRPCS establishes interim and long-term mitigation, identifies conservation areas, and describes how preserves will be established and managed. The SRPCS also includes guidelines for translocation, management plans, adaptive management, and funding. Finally, the SRPCS describes the implementation planning process.

The County of Sonoma, the Cities of Santa Rosa, Cotati, Rohnert Park, the Town of Windsor, Service, and CDFG have commenced a process to develop a plan for implementing the SRPCS. An implementation committee has been formed that is comprised of elected and staff representatives of the local jurisdictions and representatives of the agricultural, development, and environmental communities. Staff representatives from the Service and CDFG provide technical assistance to the implementation committee. The implementation plan is expected to provide a mechanism for applying the SRPCS to cover public and private projects, agricultural activities, and residential and commercial development.

The Service and CDFG are implementing interim mitigation guidelines (Service and CDFG *in litt.* 2006.) for Federal and non-federal actions. This Programmatic has integrated many of the guidelines in the SRPCS and interim mitigation guidelines in the Description of the Proposed Action.

The Service will also prepare a recovery plan for the Sonoma County Distinct Population Segment of the California tiger salamander and listed plants as required by the Act. The SRPCS will be the foundation of the recovery plan; however, it does not preclude the obligation of the Service to develop a recovery plan.

Environmental Baseline

California Tiger Salamander

Adult and juvenile surveys for California tiger salamander were conducted in the winter of 2003 (Jon Winter and Associates 2004). Two adult males were captured in pitfall traps along the north project site boundary but no larvae were observed in the seasonal wetlands. One of the seasonal wetlands is likely to be inundated for a sufficient period of time to provide California tiger salamander breeding habitat and the annual grassland habitat provides potential aestivation habitat; no gopher mounds were observed and whether or not the grassland functions as aestivation habitat depends heavily upon the availability of aestivation sites, many of which would be eliminated as part of an annual discing process to control fuels.

Other California tiger salamander observations have been made almost directly west of the proposed project between Juniper and Primrose Avenues, and directly to the south approximately 300 ft (91.44 m) south of West Robles Avenue. The proposed project site is within 2,200 ft (670.56 m) of each of these off-site observations.

Burke's goldfield, Sonoma sunshine, and Sebastopol meadowfoam

The on-site wetlands belong to the class of seasonal wetlands that includes vernal pools and connecting swales that have the potential to provide suitable habitat for the listed plants. Botanical surveys were conducted in 1993, 1999, 2000, 2001, and 2008 during the appropriate bloom seasons, but did not detect any of the listed plants within the project area (Northern 1993; Jane Valerius Environmental Consulting 2001; and Stromberg 2008). However, the surveys were not conducted according to the Service-approved protocol. The nearest known location (CNDDB occurrence 26) of Sebastopol meadowfoam is 1.16 miles west near the intersection of Todd and Stony Point Roads and the nearest recent observation (CNDDB occurrence 1) (Aryes and Sloope *in litt.* 2008) is 1.51 miles west. The nearest known location (CNDDB occurrence 29) of Burke's goldfields is 2.84 miles while the nearest recent observation (CNDDB occurrence 28) is 3.50 miles away. The nearest known location (CNDDB occurrence 17) of Sonoma sunshine is 1.20 miles away, while the nearest recent observation (CNDDB occurrence 29) is 1.67 miles away. The on-site wetlands are dominated by a suite of plant species with which Sebastopol meadowfoam and the other listed plant species are not known to occur.

All three listed plants have the potential to occur on-site due to the close proximity of the site to historical and current locations of each species; however, the purchase of credits at a Service approved Preserve are expected to compensate for the loss of these wetlands.

Effects of the Proposed Action

California tiger salamander

California tiger salamanders would be directly affected by construction activities that disturb upland habitat (small mammal burrows) and breeding areas. A total of 4.13 ac (1.67 ha) of upland habitat will be permanently lost as a result of this project. The purchase of 8.3 credits (3 to 1 ratio) of California tiger salamander upland habitat at a Service approved Preserve is expected to minimize the loss of this habitat. The ratio was adopted from those developed for the SRPCS and is anticipated to aid in conserving appropriate levels of habitat to support viable populations of California tiger salamanders in perpetuity. The avoidance and minimization measures identified above are expected to contribute to recovery of the Sonoma Distinct Population Segment of the California tiger salamander by preserving occupied, restored, and created habitat as identified in the SRPCS. Adaptive management and monitoring will be supported through the endowments associated with individual Preserves and is expected to assist in the maintenance of viable populations.

Individual California tiger salamanders that are within the project area could be harassed, injured, or killed during construction activities that collapse burrows and unearth individuals. Additionally, any California tiger salamanders that are discovered during biological monitoring may also be harassed, injured, or killed during relocation to suitable offsite burrows. The effect of relocation of individual California tiger salamanders is not well known, but temporary movements of a few hundred meters during the dry season is not believed to pose significant risks (P. Trenham, Service, Sacramento, California, personal communication to M. Thomas, Service, Sacramento, California May 22, 2006).

Individual California tiger salamanders disturbed by construction activities may attempt above ground movement in an effort to find alternative burrows. Individuals attempting this could be injured or killed by vehicles and/or foot traffic, as well as being exposed to an increased risk of predation and desiccation. Injury or death of salamanders during construction will by minimized by implementing the Avoidance and Minimization Measures. These individuals may also become trapped in trenches or holes overnight or encounter oil and other petroleum based products; however implementation of the Avoidance and Minimization Measures should reduce these effects by performing pre-construction surveys and relocating any California tiger salamanders discovered.

In addition to direct effects, several indirect effects may also occur to California tiger salamanders from construction activities. Reduced fitness and survivability may occur as a result of relocating individuals. Relocated individuals may attempt to return to their capture location expending stored energy reserves and exposure to dry summer conditions. This is expected to be minimized by implementing the conservation measures by having relocation sites identified and approved by the Service prior to relocation.

Burke's goldfield, Sonoma sunshine, and Sebastopol meadowfoam

The proposed project will result in the permanent loss of 0.07 ac (0.03 ha) of seasonal wetland habitat for all three plant species. Even though botanical surveys were conducted and no listed plants were observed, the applicant assumed presence of the Sebastopol meadowfoam based on the project's proximity to known occurrences. Based on this assumption, all Sebastopol meadowfoam, plants and their associated seed source within the action area will be permanently lost as a result of the proposed project. Since Burke's goldfield and Sonoma sunshine share the same habitat as the meadowfoam, all Burke's goldfields, Sonoma sunshine plants, and their associated seed sources within the action area are also expected to be permanently lost as a result of the proposed project.

As described in the Status of the Species and Environmental Baseline sections, above, habitat for the listed plant species has been severely affected on the Santa Rosa Plain as a result of urban and agricultural development. These species, which are naturally rare, narrow endemics, have become extremely vulnerable due to decreases in population size, habitat fragmentation, and chronic habitat degradation. The long-term survival and recovery of these species requires the establishment of a viable regional preserve system that includes restoration of degraded habitat to enhance overall population size and viability.

The proposed project is expected to result in direct effects to 0.07 ac (0.03 ha) of seasonal wetlands which may be occupied (or assumed occupied) by the listed plants. These effects will further reduce the size and numbers of the listed plant populations, and could reduce the extent of the range for each of the listed plant species on the Santa Rosa Plain. The proposed project is also likely to result in fragmentation and edge effects to existing habitat. The loss of seasonal wetlands where the listed plants have not been found is expected to reduce opportunities for habitat restoration and enhancement of listed plant populations, thereby potentially affecting the species long-term survival and recovery. However, the purchase of 0.11 ac (0.04 ha) at a Service approved bank is expected to compensate for the loss of this habitat. The compensation is consistent with the ratios provided in the Programmatic BO. The compensation land will be preserved and managed in perpetuity.

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 considered in this biological opinion. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act.

Cumulative effects to the California tiger salamander include continuing and future conversion of suitable California tiger salamander breeding, foraging, sheltering, and dispersal habitat resulting from urban development. Additional urbanization can result in road widening and

increased traffic on roads that bisect breeding and upland sites, thereby increasing road-kill while reducing in size and further fragmenting remaining habitats.

California tiger salamanders probably are exposed to a variety of pesticides and other chemicals throughout their range. California tiger salamanders also could die from starvation by the loss of their prey base. Hydrocarbon and other contamination from oil production and road runoff; the application of numerous chemicals for roadside maintenance; urban/suburban landscape maintenance; and rodent and vector control programs may all have negative effects on California tiger salamander populations. In addition, California tiger salamanders may be harmed through collection by local residents.

A commonly used method to control mosquitoes in Sonoma County (Marin/Sonoma Mosquito and Vector Control District, internet website 2002), is the application of methoprene, which increases the level of some juvenile hormones in insect larvae and disrupts the molting process. Lawrenz (1984) found that methoprene (Altosid ®) retarded the development of selected crustacea that had the same molting hormones (*i.e.*, juvenile hormone) as insects, and anticipated that the same hormone may control metamorphosis in other arthropods. Because the success of many aquatic vertebrates relies on an abundance of invertebrates in temporary wetlands, any delay in insect growth could reduce the numbers and density of prey available (Lawrenz 1984). Two other commonly use methods to control mosquitoes are the use of mosquito fish (*Gambusia affinis*) and a microbial insecticide Bti (*Bacillus thuringiensis israeliensis*)

Threats to Burke's goldfields, Sonoma sunshine, and Sebastopol meadowfoam such as unauthorized fill of wetlands, urbanization, increases in non-native species, and expanded irrigation of pastures with recycled wastewater discharge, are likely to continue with concomitant adverse effects on these species resulting in additional habitat loss and degradation; increasingly isolated populations (exacerbating the disruption of gene flow patterns); and further reductions in the reproduction, numbers, and distribution of these species which will decrease their ability to respond to stochastic events.

On-going grazing on the Santa Rosa Plain appears to be occurring at a low enough level that it may actually benefit the species by controlling competitive and non-native plant species, but grazing could increase to a detrimental level in the future. The cessation of grazing may also have an adversely affect on listed species, since non-native competitors have invaded the species' habitat and grazing may currently play an essential role in controlling these competitors.

As stated in the SRPCS, urban and rural growth on the Santa Rosa Plain has taken place for over one hundred years and for the past twenty years urban growth has encroached into areas inhabited by the California tiger salamander and the listed plants. The loss of seasonal wetlands caused by development on the Santa Rosa Plain has led to declines in the populations of California tiger salamander and the listed plants. Voters in the cities of Cotati, Rohnert Park, Santa Rosa, and Sebastopol, and the Town of Windsor have established urban growth boundaries for their communities. This is intended to accomplish the goal of city-centered growth, resulting

in rural and agricultural land uses being maintained between the urbanized areas. Therefore, it can be reasonably expected that rural land uses will continue into the foreseeable future. There are also areas of publicly owned property and preserves located in the Santa Rosa Plain, which will further protect against development. Some of the areas within these urban growth boundaries, however, include lands inhabited by California tiger salamanders and the listed plant species. Agricultural practices have also disturbed seasonal wetlands, California tiger salamanders and listed plant habitat on the Santa Rosa Plain. Some agricultural practices, such as irrigated or grazed pasture, have protected habitat from intensive development.

The SRPCS was designed to plan for future cumulative effects from federal and non-federal actions to the California tiger salamander, listed plants, and their habitats within the Santa Rosa Plain. The SRPCS and the interim guidelines are intended to benefit the California tiger salamander and the listed plants by providing a consistent approach for compensation vital to habitat preservation and the long-term conservation of the species. The guidelines are also intended to provide more certainty and efficiency in the project review process. The SRPCS and the interim guidelines provide guidance to focus compensation efforts on preventing further habitat fragmentation and to establish, to the maximum extent possible, a viable preserve system that will contribute to the long-term conservation and recovery of these listed species.

The County of Sonoma, the Cities of Santa Rosa, Cotati, Rohnert Park, the Town of Windsor, Service, and CDFG have commenced a process to develop a plan for implementing the SRPCS. An implementation committee has been formed that is comprised of elected and staff representatives of the local jurisdictions, staff representatives of Service and CDFG, and representatives of the agricultural, development, and environmental communities. The implementation plan is expected to provide a mechanism for applying the SRPCS to cover public and private projects, agricultural activities, and residential and commercial development. Eventual implementation of the SRPCS by the local cities and Sonoma County is expected to reduce potential increases of these cumulative effects.

Conclusion

After reviewing the current status of the Sonoma County Distinct Population Segment of the California tiger salamander, Burke's goldfields, Sonoma sunshine, and Sebastopol meadowfoam; the environmental baselines for the action area; the effects of the proposed action including all measures to avoid, minimize, and mitigate adverse affects; and the cumulative effects, it is the Service's biological opinion that issuance of an incidental take permit pursuant to section 10(a)(1)(B) of the Act is not likely to jeopardize the continued existence of the Sonoma County Distinct Population Segment of the California tiger salamander, Burke's goldfields, Sonoma sunshine, or Sebastopol meadowfoam. The project is located outside any designated critical habitat for the California tiger salamander; therefore, no critical habitat for this species will be destroyed or adversely modified. No critical habitat has been proposed or designated for Burke's goldfields, Sonoma sunshine, or Sebastopol meadowfoam; therefore, no critical habitat for these species will be affected by the proposed action.

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 under the Act 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 the Service as an intentional or negligent act or omission which creates the likelihood of injury to a listed species by annoying it to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding, or sheltering. Harm is defined by the Service to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns including breeding, feeding, or sheltering (50 CFR 17.3). Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity (50 CFR 402.02). 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 this Incidental Take Statement.

The proposed Low-Effect Habitat Conservation Plan for the Sonoma County Distinct Population Segment of the California tiger salamander and Sebastopol meadowfoam for the Sonoma County Office of Education Dutton Avenue School identifies anticipated affects to the California tiger salamander and meadowfoam that are likely to result from the proposed taking and the measures that are necessary and appropriate to minimize and mitigate those affects. All mitigation measures described in the proposed HCP, together with the terms and conditions described in any section 10(a)(1)(B) permit issued with respect to the proposed HCP, are hereby incorporated by reference as reasonable and prudent measures and terms and conditions within this Incidental Take Statement pursuant to 50 CFR §402.14(I). Such terms and conditions are non-discretionary and must be undertaken for the exemptions under section 10(a)(1)(B) and section 7(o)(2) of the Act to apply. If the permittee fails to adhere to these terms and conditions, the protective coverage of the section 10(a)(1)(B) permit and section 7(o)(2) may lapse. The amount or extent of incidental take anticipated under the proposed Low-Effect Habitat Conservation Plan for the Sonoma County Distinct Population Segment of the California tiger salamander and Sebastopol meadowfoam for the Sonoma County Office of Education Dutton Avenue School, and associated reporting requirements, are as described in the HCP and its accompanying section 10(a)(1)(B) permit.

Sections 7(b)(4) and 7(o)(2) of the Act generally do not apply to listed plant species. However, protection of listed plants is provided to the extent that the Act prohibits the removal and reduction to possession of federally listed plants or the malicious damage of such plants on areas under Federal jurisdiction, or the destruction of listed 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

The Service anticipates incidental take of the Sonoma County Distinct Population Segment of the California tiger salamander will be difficult to detect for the following reasons: (1) the elusive nature; (2) their small size; (3) cryptic coloration; (4) fossorial nature; (5) seasonal fluctuations in population numbers; and (6) the species occur in habitat that make finding a dead or impaired specimen unlikely. For these reasons, the Service anticipates that all individual California tiger salamanders inhabiting 4.42 ac will be subject to take by the proposed project. Take is expected to be in the form of harm, harassment, capture, injury, and mortality. Upon implementation of the reasonable and prudent measures, incidental take associated with the proposed project will become exempt from the prohibitions described under section 9 of the Act.

Effect of the Take

The Service has determined that the level of anticipated take is not likely to result in jeopardy to the Sonoma Distinct Population Segment of the California tiger salamander. No critical habitat for the California tiger salamander is located in the action area; therefore, no critical habitat for this species will be destroyed or adversely modified. The Service has determined that the level of anticipated take is not likely to result in jeopardy to Sebastopol meadowfoam, Burke's goldfields, or Sonoma sunshine No critical habitat has been proposed or designated for the Sebastopol meadowfoam, Burke's goldfields, or Sonoma sunshine; therefore, none will be affected by the proposed action.

Reasonable and Prudent Measures

The Service believes the following reasonable and prudent measures are necessary and appropriate to minimize the effect of take on the Sonoma County Distinct Population Segment of the California tiger salamander:

1. Take in the form of harm, harassment, and mortality of California tiger salamanders during construction activities and/or activities associated with implementing the project shall be minimized.

2. The effects to California tiger salamanders resulting from habitat modification and temporary degradation of habitat shall be minimized and, to the greatest extent practicable, habitat shall be restored to its pre-project condition.

Terms and Conditions

In order to be exempt from the prohibitions of section 9 of the Act, the applicant must ensure that the proposed project complies with the following terms and conditions, which implement the reasonable and prudent measures described above. These terms and conditions are nondiscretionary.

The following terms and conditions implement Reasonable and Prudent Measure number one (1) and two (2):

a. The project applicant shall adhere to the project description, proposed minimization measures, as well as the proposed conservation measures as described in the June 20, 2008 Low-Effect Habitat Conservation Plan for the California tiger salamander and Sebastopol meadowfoam, Proposed Community School Site, Santa Rosa, California (Stromberg 2008), and as summarized in the project description of this biological opinion.

b. The project applicant shall adhere to the reporting requirements as described below in this biological opinion.

Reporting Requirements

The Service shall be notified immediately by facsimile or telephone and in writing within one (1) working day of any unanticipated take of California tiger salamander, or unanticipated project-related damage to the species' habitat associated with project construction, minimization measures, or operation. Injured California tiger salamanders must be cared for by a licensed veterinarian or other qualified person(s), such as the Service-approved biologist. The Service shall be notified immediately by facsimile or telephone and in writing within one (1) working day of any take or suspected take of listed wildlife species not authorized in this opinion. The Service must also be notified within one (1) working day of any removal of Sebastopol meadowfoam, Burke's goldfield, or Sonoma sunshine. 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 this 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 Chris Nagano, Deputy Assistant Field Supervisor (Endangered Species Program) at the Sacramento Fish and Wildlife Office at 916/414-6600; and Daniel Crumm, Resident Agent-in-Charge of the Service's Division of Law Enforcement, 2800 Cottage Way, Room W-2928, Sacramento, California 95825, at 916/414-6660.

The Sonoma County Office of Education shall notify the Service within 60 calendar days following the completion of construction activities. A written report shall be submitted to the Chief of the Conservation Planning & Recovery Division at the Sacramento Fish and Wildlife Office. At a minimum, the report shall contain the following information: (1) a brief summary of project actions and construction; (2) construction dates; (3) pertinent information concerning the permittee's success in meeting the project mitigation measures, including any problems that occurred which might have prevented compliance with this biological opinion; (4) an

explanation of failure to meet such measures, if any; (5) known project effects on federally listed species; (6) occurrences of incidental take of federally listed species; and (7) any additional pertinent information. The report should be sent to U.S. Fish and Wildlife Service, Endangered Species Division, 2800 Cottage Way, Room W-2605, Sacramento, 95825-1846.

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 has no conservation recommendations for the proposed action considered in this biological opinion.

REINITIATION - CLOSING STATEMENT

This concludes formal consultation on the proposed issuance of a section 10(a)(1)(B) permit to implement the Sonoma County Office of Education Low-Effect Habitat Conservation Plan for the California tiger salamander and Sebastopol meadowfoam, for the Proposed Community School Site, Santa Rosa, California. As provided in 50 CFR §402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been maintained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded; (2) new information reveals that the action may affect listed species or critical habitat in a manner or to an extent not considered in this biological opinion; (3) the projects are subsequently modified in an manner that causes an effect to the listed species or critical habitat that was not considered in this biological opinion; or (4) a new species is listed or critical habitat designated that was not addressed by the HCP and may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation. A reinitiated consultation shall take into consideration the assurances that the Applicants will receive in accordance with "No Surprises" regulations [50 CFR §17.22(b)(5) and §17.32(b)(5)] as these are described in the HCP.

If you have any questions regarding this biological opinion, please contact the Division Chief of Conservation Planning and Recovery at (916) 414-6600.

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