United States Department of the Interior

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IN REPLY REFER TO:
1-1-98-F-0053

July 17, 1998

Mr. Calvin Fong
Chief, Regulatory Branch
Department of the Army
U.S. Army Engineer District,
San Francisco District, Corps of Engineers
333 Market Street
San Francisco, California 94105-2197

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

Dear Mr. Fong:

This is in response to your February 6, 1998, letter initiating formal consultation with the U.S. Fish and Wildlife Service (Service) for all Clean Water Act Section 404 permit activities that may affect federally listed plants on the Santa Rosa Plain, Sonoma County, California. Your request was received in our office on February 11, 1998. This document represents the Service's biological opinion regarding the effects on four federally listed endangered plant species, Sonoma sunshine (*Blennosperma bakeri*), Burke's goldfields (*Lasthenia burkei*), Sebastopol meadowfoam (*Limnanthes vinculans*), and many-flowered navarretia (*Navarretia leucocephala* ssp. *plieantha*), which would result from 404 permit issuance that is consistent with this programmatic consultation. This consultation document has been prepared pursuant to section 7 of the Endangered Species Act of 1973, as amended (Act), and 50 CFR 402 of our interagency regulations governing section 7 of the Act.

The purpose of this programmatic consultation document is twofold:

(1) to expedite formal consultations, on a project-by-project basis, for limited effects to listed species in "low-quality"[1] seasonal wetlands, under specifically defined circumstances; and

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[1] The term "low-quality" has specific meaning in the context of the Santa Rosa Plain Vernal Pool Ecosystem Preservation Program and does not denote biological value. For the purpose of this programmatic consultation, low-quality seasonal wetlands are those which score as low-quality under biological resource criteria outlined in the Army Corps of Engineers Habitat Quality Evaluation Procedure. (See also definition section of this programmatic consultation.)

(2) to outline a comprehensive conservation program that would address effects to the listed species resulting from 404 permit issuance for fill of seasonal wetlands throughout the Santa Rosa Plain.

Future projects meeting the conditions specified below, or that the Sacramento Fish and Wildlife Office (SFWO) of the Service has determined will have similar impacts, may be appended to this consultation document.

This biological opinion is based on information provided in 1) the Santa Rosa Plain Vernal Pool Ecosystem Preservation Plan (VPEPP) (CH2M Hill 1995); 2) the Seasonal Wetland Baseline Report for the Santa Rosa Plain, Sonoma County (Patterson *et al.* 1994); 3) the Public Notice of a General Permit for Fill of Vernal Pool and Seasonal Wetlands in the Santa Rosa Plain, dated September 3, 1997, from the U.S. Army Corps of Engineers (Corps); 4) a letter from the Service dated October 31, 1997, responding to the public notice; and 5) numerous meetings with the Corps and other members of the Vernal Pool Task Force as described in the Consultation History/Background section of this document, below. A complete administrative record of this consultation is on file at the Service's SFWO.

The Service will reevaluate the effectiveness of this programmatic consultation document on the Santa Rosa Plain vernal pool plant species at least every six (6) months to ensure that continued implementation will not result in effects to the listed species that would preclude their survival and recovery. This opinion may be modified during reevaluation if it is determined that projects allowed through the programmatic consultation could preclude the survival and recovery of the listed species.

Consultation History/Background

Representatives of various regulatory and resource agencies (including the Service), local government entities, environmental groups, local developers, representatives of agriculture, and landowners formed the Vernal Pool Task Force in 1991. The Task Force was formed to address the concerns of the Santa Rosa community regarding issuance of permits for seasonal wetland fills, in light of the pending listing of three endangered plant species: Sonoma sunshine, Burke's goldfields, and Sebastopol meadowfoam. The study area for the task force was selected to include most of the ranges for these species, which are primarily restricted to the seasonal wetlands of the Santa Rosa Plain. Federal, State, and local agencies entered into a Memorandum of Understanding (MOU) to formally establish cooperative relationships for development of the Santa Rosa Plain Vernal Pool Preservation Program, a component of which is the VPEPP. The Task Force planned to complete the VPEPP in two phases, with the first phase focusing on planning and the second phase to involve implementation.

In 1995, the Task Force completed the VPEPP Phase I Final Report. The Phase I Report explains the program's history and outlines the goals and objectives for Phases 1 and 2 of the program. The report contains background information important in the Task Force planning efforts, including information on (1) the Santa Rosa Plain, its ecosystems, and its sensitive species; (2) historic, current, and planned land uses on the Santa Rosa Plain; (3) basic conservation and preserve design principles; and (4) data sources and procedures for entering

information into a Geographic Information System (GIS). Details of the regional planning effort undertaken by the Task Force are also presented in the report. These include (1) a map showing the areas potentially supporting the vernal pool ecosystem throughout the plain (approximately 35,333 acres, or 64 percent, of the study area); (2) applicable state and federal laws and regulations; (3) a process for evaluating vernal pool sites in terms of habitat quality, land use, acquisition feasibility, and restoration potential; (4) a habitat quality map for seasonal wetlands that had been so evaluated along with descriptions of 27 "high-quality"[2] sites; (5) discussions of land use compatibility with vernal pool conservation; (6) the potential roles of habitat restoration and enhancement; (7) general guidelines for management, maintenance, and monitoring of vernal pool preserves; (8) regulatory and non-regulatory tools that could be used for plan implementation; and (9) options for conservation and management, acquisition of interests, transferable development rights, and potential funding. The Phase I Report proposed a regulatory process, to be implemented during Phase 2, for streamlined project compliance with Federal and State laws, and with local land use policies and ordinances.

Chapter 9 of the Phase 1 Report lists the tasks expected to be completed during Phase 2 of the program. One of these tasks was for the local jurisdiction to apply for a General Permit (GP) under section 404 of the Clean Water Act for fills in "low-quality" seasonal wetlands of the Santa Rosa Plain. As recommended in the Phase 1 Report, the Cities of Santa Rosa, Cotati, and Rohnert Park, the Town of Windsor, and the County of Sonoma applied to the San Francisco Corps for a GP. A public notice, dated September 3, 1997, was circulated to solicit comments on the GP. The Service provided a letter, dated October 31, 1997, responding to the public notice with numerous recommendations, and stating that the Corps should initiate consultation pursuant to section 7 of the Act for Burke's goldfields, Sebastopol meadowfoam, Sonoma sunshine, and the California red-legged frog (*Rana aurora draytonii*). During subsequent informal consultation with the Corps, it was determined that initiation of formal consultation on the GP and issuance of the GP would be premature because of the lack of local procedures to administer the permit and ensure compliance. The Service and the Corps therefore agreed that a programmatic consultation for individual projects on the Santa Rosa Plain should be initiated instead. It was also determined that any potential effects to the red-legged frog would be addressed through individual consultation, when necessary, and that the programmatic consultation should address potential effects to the newly listed many-flowered navarretia. The Corps sent the Service a letter, dated February 6, 1998, and received February 11, 1998, requesting a formal programmatic consultation for all Clean Water Act permit activities on the Santa Rosa Plain that may affect Sonoma sunshine, Burke's goldfields, Sebastopol meadowfoam, and many-flowered navarretia (hereafter collectively called "the listed plants").

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[2] The term "high-quality" has specific meaning in the context of the Santa Rosa Plain Vernal Pool Ecosystem Preservation Program and does not denote biological value. For the purpose of this programmatic consultation, high-quality seasonal wetlands are those which exceed a specific score under biological resource criteria ranking outlined in the Army Corps of Engineers Habitat Quality Evaluation Procedure. (See also definition section of this programmatic consultation.)

Definitions

For the purpose of this biological opinion, the following definitions will apply.

Low-quality/High-Quality Seasonal Wetlands. Seasonal wetlands will be ranked as "low" or "high" quality using the biological resources category of the Corps' Habitat Quality Evaluation procedure (HQE) manual. The HQE was developed to determine whether a site (1) qualifies for a streamlined permitting process or (2) requires an individual permit. The evaluation does not denote biological value. The Land Use and Acquisition Feasibility categories of the HQE will not be used in the ranking of seasonal wetlands for this programmatic.

Direct Effect. If any part of a vernal pool is filled or otherwise destroyed, the entire pool is directly affected.

Indirect Effect. Habitat indirectly affected includes all habitat supported by destroyed upland areas and swales, and all habitat otherwise damaged by loss of watershed, human intrusion, introduced species, and pollution caused by the project (see Effects of the Proposed Action, below). Where the reach of these effects cannot be determined definitively, all habitat within 250 feet of proposed development may be considered indirectly affected. If any habitat within a vernal pool complex is destroyed, all remaining habitat within the complex may potentially be indirectly affected.

Vernal Pool Restoration. Restoring areas that were historically vernal pools, but no longer support vernal pool species, to fully functional vernal pool habitat that supports viable populations of vernal pool indicator species (Larry Stromberg, 1998 *in litt.*).

Vernal Pool Construction. The establishment of fully functional vernal pool habitat, supporting viable populations of vernal pool indicator species, in an area that was historically upland habitat (L. Stromberg, 1998 *in litt.*).

BIOLOGICAL OPINION

Description of the Proposed Action

For the purpose of this biological opinion, the action area is the region known as the Santa Rosa Plain, as shown in Figure 1. This area includes 55,000 acres in Sonoma County, extending from Windsor to Cotati and from Santa Rosa to Sebastopol. The proposed actions are as follows: a) issuance of 404 permits to allow fill of up to 50 acres of low-quality seasonal wetlands during an interim period prior to establishment of a comprehensive conservation program for the Santa Rosa Plain; and b) issuance of 404 permits for fill of seasonal wetlands throughout the Santa Rosa Plain for all projects that are consistent with a comprehensive conservation program allowing for the long-term survival and recovery of the listed plant species addressed in this opinion. Projects within the action area that affect habitat for the listed plants may be processed under this programmatic consultation if they are consistent with either the interim program described in section A, below, or a comprehensive conservation program meeting the criteria described in section B, below. The Service anticipates the Corps could issue a General 404

Permit for fill of up to 50 acres of seasonal wetlands, incorporating permit conditions consistent with the interim measures described in this biological opinion. The Service expects once the 50-acre threshold for the interim program has been reached, consultation will not be reinitiated to increase the threshold unless significant progress has been made on the comprehensive conservation program.

A. Interim Program for Low-Quality Habitat

1. Project qualifications and acreage limits

During the interim period prior to the establishment of a comprehensive conservation program as described in section B, below, the following acreage limits and qualifications will be applied.

a. Overall acreage limits. The total amount of direct and indirect impact to low-quality seasonal wetlands filled during the interim period will not exceed 50 acres, no more than 30 acres of which would be occupied (or presumed to be occupied) by the listed plant species. Of the 30 impacted acres which are occupied or presumed occupied, no more than 6 acres would be on sites for which there are known records of the listed plants. Impacts to no more than 6 additional acres on sites for which there are known records of listed plants may be authorized under this opinion at the Service's discretion, based upon the Service's evaluation of the significance of impacts to the first 6 acres of known listed species habitat and/or upon substantial progress toward a comprehensive conservation program. Substantial progress may consist of actions such as 1) establishment of preservation and restoration mitigation banks within each mitigation unit defined below, 2) identification and protection of extant populations of Burke's goldfields, Sonoma sunshine, and Sebastopol meadowfoam within each mitigation unit, 3) identification and protection of areas suitable for restoration within each mitigation unit, 4) establishment of restoration/construction standards, guidelines, success criteria, and contingency measures, 5) successful introduction of Burke's goldfields, Sonoma sunshine, and Sebastopol meadowfoam in restored habitat within each mitigation unit, and/or 6) formal commitment to participate in development of a meaningful conservation planning program for the Santa Rosa Plain. The Service will determine when sufficient progress has been made to allow impacts to the additional 6 acres, or increments thereof, at sites for which there are known records for the listed plant species.

b. Project acreage limits. For each project, no more than 3 acres of seasonal wetlands will be affected, including both direct and indirect effects (see definition section, above). Interrelated and interdependent actions must be treated as a single project and cannot be "piece-mealed" to meet this requirement.

c. Habitat quality. Projects allowed under this consultation will not impact seasonal wetlands that rate as high-quality for biological resources according to the Corps HQE manual.

d. Consistency with comprehensive planning. No project will be allowed under this consultation if the Service has determined that the project will preclude long-term

planning options for the establishment of a regional preserve system that would allow for the survival and recovery of the listed plant species.

Projects that are not consistent with these conditions may be allowed under this interim program only as the Service deems appropriate. For example, a project that affects more than 3 acres of seasonal wetlands, but has effects similar in scope and nature to those analyzed in this biological opinion as determined by the Service, may be allowed under this program.

2. Mitigation

This section describes the mitigation requirements for impacts to seasonal wetlands allowed under this consultation for the interim program.

Determination of affected acreage. Affected acreage is based on direct and indirect effects (see Definitions, above) of the project on seasonal wetlands.

Listed species presence. A project applicant may choose whether to have the project site surveyed for listed plant species, consistent with established Service protocol (Guidelines for Conducting and Reporting Botanical Inventories for Federally Listed Plants on the Santa Rosa Plain, Appendix A).

a. If the applicant chooses not to survey, the Service will assume the listed species are present throughout the seasonal wetlands on-site.

b. Because of the probable persistence of seed banks (see Status of the Species and Environmental Baseline), all seasonal wetlands on sites with any past record of listed species presence will be treated as currently occupied habitat, regardless of whether current surveys have detected the species on-site.

c. If surveys have been conducted according to Service protocol and no listed plants have been found, the seasonal wetlands on-site will be treated as habitat. This programmatic consultation addresses effects and mitigation for this habitat type where the listed plants have not yet been observed because a persistent seed bank may be present even if the plants have not been detected, and because currently unoccupied but restorable habitat is believed to be important for the survival and recovery of the species covered in this biological opinion. (See also Status of the Species and Environmental Baseline.)

Components of mitigation. Project effects will be mitigated by both preservation and restoration/construction (see Definitions above) components. The preservation component may be fulfilled either by dedicating acreage within a Service-approved ecosystem preservation bank, or, based on Service evaluation of site-specific conservation values, preserving high-quality seasonal wetlands on the project site or on another non-bank site as approved by the Service. Habitat not ranked as high-quality may be evaluated for mitigation suitability on a case-by-case basis. Similarly, the restoration/construction component may be fulfilled by dedicating acreage

within a Service-approved habitat restoration/construction mitigation bank, or, based on Service evaluation of site-specific conservation values, restoring/constructing on the project site or on another non-bank site as approved by the Service. In cases where appropriate mitigation banks are unavailable, the Service may accept payment of in lieu fees for the preservation and/or restoration/construction components of mitigation. Mitigation ratios to be applied in particular cases are given in the key below and in Table 1. All mitigation sites and restoration/construction plans must be approved by the Service.

Habitat quality of mitigation site. Any seasonal wetlands to be preserved for mitigation purposes should be ranked as high-quality for biological resources, as determined using the Corps' HQE methodology. A site which is not ranked as high-quality for biological resources may in some cases be used for the preservation component of mitigation, if it is approved by the Service on a case-by-case basis, although a higher mitigation ratio may be required if lower quality mitigation habitat is used.

In-bank/Out-of-bank. When mitigation involves preservation within a mitigation bank, or land of comparable value, the required mitigation ratios are lower than when other lands are preserved. A site is considered to have value comparable to a mitigation bank if either (I) it is adjacent to a Service-approved mitigation bank or other large block of preserved habitat; or (ii) it consists of all or a portion of a site where at least 50 contiguous acres will be preserved for biological values in perpetuity.

Preservation in perpetuity. All the vernal pool habitat and supporting uplands to be preserved for mitigation purposes are to be protected in perpetuity by a Service-approved conservation easement or similarly protective covenants in the deed. The conservation easement on the mitigation land is to be recorded at the appropriate recording office prior to project impacts. The easement/deed, including a title report for the land area, must be reviewed and approved by the Service prior to recordation. A copy of the recorded easement/deed must be provided to the Service within 30 days after recordation. Standard examples of deed restrictions and conservation easements are available from the Service upon request.

Operation and maintenance. All mitigation sites will be operated and maintained in accordance with a site specific operation and maintenance plan approved by the Service. A site specific monitoring plan, approved by the Service, should also be implemented to provide information regarding the effectiveness of management practices, and to provide for adaptations to the management strategies if necessary.

Seed/soil collection. Permanent direct effects to sites where the listed plant species are currently found or have been known in the past must be further mitigated by collection of seed from the listed species and/or collection of soil, unless otherwise approved by the Service. Seed and/or soil will be stored under appropriate conditions until it can be used for restoration or reintroduction of endangered plant populations. Methods of collection and repositories for the seed and/or soil must be approved by the Service prior to any collecting activities.

Area-based mitigation. The action area is divided into the following mitigation units:

a. northern unit: north of Airport Boulevard;
b. central unit: between Airport Boulevard and Highway 12; and
c. southern unit: south of Highway 12.

To assure impacts during the interim planning period do not preclude the ability of the long-term conservation program to protect and restore the listed plants throughout their respective ranges (see Status of the Species section, Status and Distribution), mitigation must take place within the unit where the impact occurs unless otherwise approved by the Service. Should future data fail to support the delineation of separate mitigation units, this approach may be modified.

Habitat ranking and mitigation ratios. All sites must be ranked according to the HQE manual. Once a site has been ranked and surveyed, mitigation requirements can be identified using the key below and Table 1 (page 9). Mitigation ratios identified below are to be read as acreage of mitigation: affected acreage (e.g., 2:1 = 2 acres of mitigation required for 1 acre affected). Affected acreage is based on direct and indirect effects of the project on listed plant species habitat. If endangered plant species have been observed or are assumed to be present at a site, all seasonal wetlands at that site are to be mitigated as if the species is present in them.

1a. If the site scores as high-quality for biological resources according to the HQE, the project cannot be appended to this opinion. An individual permit is required.

1b. If the site scores as low-quality for biological resources according to the HQE, go to #2.

2a. If the wetlands on the site include no seasonal wetlands as defined in this biological opinion, apply for Corps nationwide permit or individual permit for any riparian or fresh water marsh wetlands.

2b. If the wetlands on the site include seasonal wetlands, mitigate through restoration/construction and preservation.

Restoration/construction: Restore or construct seasonal wetlands at a mitigation ratio of 1:1 if the restoration/construction has been deemed successful by the Service prior to project impacts (with demonstrated functional vernal pool hydrology for at least 1 year), or at a ratio of 1.5:1 if the project proceeds before the hydrology of the restoration/construction site has been deemed successful.

Preservation: To determine preservation requirements, conduct appropriate surveys for the listed plants based on USFWS guidelines (Guidelines for Conducting and Reporting Botanical Inventories for Federally Listed Plants on the Santa Rosa Plain, Appendix A), or assume the listed plants are present. Check for previously recorded occurrences of the listed species on the site. Go to #3.

3a. If surveys conducted according to Service protocol detect no listed plants, and there are no previously recorded occurrences of the listed plant species on-site, preserve high-quality seasonal wetlands at a mitigation ratio of 1:1 in a mitigation bank or site with comparable value (see discussion on In-bank/Out-of-bank, above), or at a ratio of 2:1 if the mitigation land is not within a bank or site of comparable value. (If mitigation land does not consist of high-quality seasonal wetlands, site suitability and ratios may be determined by the Service on a case-by-case basis.)

3b. If listed plant species covered in this biological opinion have been observed on the site, or no surveys have been conducted, preserve high-quality seasonal wetlands at a mitigation ratio of 2:1 in a mitigation bank or site with comparable value (see discussion on In-bank/Out-of-bank, above), or at a ratio of 3:1 if the mitigation land is not within a bank or site of comparable value. (If mitigation land does not consist of high-quality seasonal wetlands, site suitability and ratios may be determined by the Service on a case-by-case basis.)

Table 1. Mitigation ratios for impacts to listed plant species on the Santa Rosa Plain.

Impacts to:	In a Bank, or Comparable[1]		Other High-Quality Sites[2]	
	Preservation	Restoration/ Construction[3]	Preservation	Restoration/ Construction[3]
Effects to seasonal wetlands where surveys have been conducted and no listed plants have been observed	1:1	1.5:1 or 1:1	2:1	1.5:1 or 1:1
Effects to seasonal wetlands where listed plants have been observed, or are assumed to be present	2:1	1.5:1 or 1:1	3:1	1.5:1 or 1:1
Ratios are to be read as acreage of mitigation: affected acreage (e.g., 2:1 = 2 acres of mitigation required for 1 acre affected). Affected acreage is based on direct and indirect effects of the project on habitat where the listed species have been observed and on other suitable habitat.				

[1] A mitigation site will be considered comparable in value to a bank if it is high-quality habitat that either: (I) is adjacent to a Service-approved mitigation bank or other large block of preserved habitat; or (ii) consists of all or part of at least 50 contiguous acres which will be preserved for biological values in perpetuity.
[2] All preservation land must consist of high-quality habitat unless otherwise approved by the Service.
[3] Mitigation will require restoration/construction at a 1.5:1 ratio for concurrent mitigation, or a 1:1 ratio if the restoration/construction has demonstrated successful hydrological conditions for at least 1 year.

3. Monitoring, interim loss restrictions, and remediation

To ensure incremental losses of habitat allowed by this biological opinion do not significantly hinder conservation of the ecosystem upon which the listed plants depend, the following measures will be taken:

a. The Service and the Corps will implement a tracking system to ensure the total amount of habitat affected by projects allowed under this consultation does not exceed the acreage limits specified above (page 5);

b. The Service and the Corps will reevaluate the effectiveness of this programmatic consultation document at least every six (6) months to ensure continued implementation will not result in effects on the listed species that would preclude their survival and recovery. This opinion may be modified to alleviate excessive effects on listed species or problems with the programmatic process; and

c. The Service is preparing a draft of the Central Valley Vernal Pool Multiple Species Recovery Plan, which addresses recovery for multiple species including the four listed plant species on the Santa Rosa Plain. Pending completion of that plan, the Service will ensure no more than 30 acres of habitat where the species have been found or are presumed to be present are filled within the action area between the date of issuance of the biological opinion and completion of the draft recovery plan. When the draft recovery plan is completed, this biological opinion will be reevaluated to determine its consistency with the goals and objectives of the recovery plan. If necessary to assure the listed species will not be jeopardized, the biological opinion will be amended to be consistent with the recovery plan. A similar reevaluation will take place upon completion of the final recovery plan.

4. Procedure for reviewing projects to be included under the programmatic consultation during the interim planning period

The following process will be used when 404 permits are issued in accordance with this biological opinion. If a General Permit is issued by the Corps for all projects that are consistent with this biological opinion, the following process will be used for each project to be authorized under the General Permit.

a. After reviewing the permit request and determining whether the project meets the conditions for coverage under the programmatic consultation, the Corps will forward to the Service all biological and other pertinent information, along with a letter requesting that the proposed project be appended to this biological opinion;

b. The Service will review the proposed project to evaluate whether it meets the conditions necessary for coverage under the programmatic consultation, and determine appropriate mitigation;

c. If the Service does not concur the project is appropriate for processing through the programmatic consultation, the Service will notify the Corps within 30 days of receipt of the information. The applicant may then seek an individual permit, or the Service, Corps, and project applicant may work together to identify project modifications that would conform to the programmatic consultation. If the Service concurs the project is appropriate for processing under the programmatic consultation, the Service will deliver to the Corps a letter specifying measures that will adequately mitigate for the impacts of the proposed project (note this could entail approval of the applicant's proposed mitigation). Also, the Service will designate a staff biologist to serve as the contact regarding the proposed project; and

d. The Corps will forward the aforementioned letter to the applicant, approving the applicant's mitigation plan, or presenting the mitigation requirements and instructing the applicant to contact the Service's staff biologist for assistance in fulfilling the applicant's mitigation responsibilities.

e. After agreeing to the project and its mitigation, the Service will provide the Corps with a letter stating the proposed project meets the requirements of the Act.

B. Comprehensive Conservation Planning Program

The goal of the comprehensive conservation planning program is to plan and establish a preserve system able to sustain viable populations of the listed plant species in perpetuity, to offset any loss of populations outside the preserve system. This program would achieve the goals and objectives outlined in Chapter 2 of the Phase 1 Report, and would fully implement Phase 2 of the VPEPP, but with a particular focus on providing assurances for the long-term survival and recovery of listed species on the Santa Rosa Plain. The following tasks must be completed to provide the Service with sufficient assurance that a preserve system will be established to offset any loss of the listed plants on the Santa Rosa Plain that would occur outside the preserve system:

1. Identification of areas targeted for conservation

The Phase 1 Report provides the results of habitat quality assessments for 32,383 acres on the Santa Rosa Plain, and identifies 27 "potential preserve sites." However, 22,365 acres (41 percent of the planning area) are designated on Figure 6-2 of the report as "unknown quality habitat." To plan effectively for the conservation of listed plant species on the Santa Rosa Plain, a thorough assessment must be completed which identifies the demographically or genetically significant populations of each listed species throughout the planning area. The existing database used for habitat evaluation should be updated based on environmental documentation that has become available since 1994. Overflights at peak flowering time for the listed plant species during years of high relative abundance would also significantly improve inventory of populations. The local governments should coordinate with the Service and California

Department of Fish and Game to determine the level of effort necessary for completing this regional habitat analysis.

Results of the planning-area-wide habitat evaluation should be used to determine which lands would be suitable for inclusion in a regional preserve system which: 1) include large, resilient core populations of each listed plant species; 2) include an array of smaller, peripheral populations to maximize genetic diversity and minimize potential effects of catastrophic events; 3) provides for experimental introduction of the listed plants; and 4) incorporates the preserve design principles described in Chapter 6 of the Phase 1 Report.

2. Local regulatory strategy

The local regulatory implementation strategies discussed in the Phase 1 Report should be set in motion so Phase 2 of the program may proceed. As described in section 8.2 of the Phase 1 Report, the local jurisdictions should revise or amend their land use policies, plans, and ordinances to establish mechanisms for preserve assembly. Each local jurisdiction should determine how their land use regulations must be modified to achieve the goals of the VPEPP.

3. Preserve design

A map should be prepared which identifies all areas that are already preserved in perpetuity, and areas that are expected to be preserved in the future through various mechanisms including local land use regulations. If "hard lines" delineating these areas cannot be drawn prior to preserve establishment, a "soft lined" approach may be used. This would entail 1) delineating a generalized target area within which preservation would occur, 2) designating a percentage or total acreage of habitat within the target area that would be preserved, and 3) developing criteria that would be applied to projects within the target area to result in establishment of a preserve system that achieves the designated amount of preservation in a biologically sound configuration.

4. Establishment of a vernal pool restoration program

The preserve system established through the conservation program should include areas suitable for restoration, and a plan should be prepared that identifies restoration areas and establishes restoration standards, guidelines, success criteria, and contingency measures. The need to accomplish this task was identified in Chapter 9 of the Phase 1 Report. The restoration plan should incorporate measures for experimental introduction of the listed species into restored pools and procedures for monitoring and evaluating the introduction efforts. The plan should also outline a process for adopting any newly discovered techniques resulting in successful species introduction into restored pools.

5. Establishment of a monitoring and adaptive management plan for the preserve system

A framework management and monitoring plan for the entire preserve system should be prepared, identifying measures to provide for the long-term viability of the listed species within the regionwide preserve system as a whole. The framework plan should emphasize monitoring methods designed with specific goals for providing information regarding overall management effectiveness, and should allow for management to continuously adapt to needs identified through monitoring (i.e., adaptive management). The framework plan should be consistent with section 7.1 of the VPEPP. Prior to establishment of the comprehensive plan, management and monitoring will be established for each mitigation site on a case-by-case basis. Once the comprehensive plan is complete, however, the management and monitoring for each site may need to be modified to be consistent with the framework management and monitoring plan. As each site is added to the preserve system after the comprehensive program is in place, a site-specific management and monitoring plan should be prepared that adopts the measures outlined in the framework plan and provides site-specific detail regarding management and monitoring. The site-specific plan should identify the party responsible for implementation of the management and monitoring.

6. Identification of the funding sources for habitat acquisition and management

At least some preserve establishment and management is expected to be provided through mitigation, habitat avoidance, and project design measures to be required through local ordinances modified to be consistent with the VPEPP. However, additional mechanisms and funding sources may be necessary to provide for adequate habitat preservation and management to avoid jeopardizing the listed plant species. If this is the case, the local jurisdictions should coordinate with Federal and State agencies to creatively explore mechanisms for funding, building, and maintaining a regional preserve system on the Santa Rosa Plain supporting viable populations of the listed species.

Status of the Species

Descriptions of the Status of the Species below include Listing History, Description, Historical and Current Distribution, Habitat, Life History, Reasons for Decline and Threats to Survival, and Recovery. Within each section, the listed species are discussed in the following order: Burke's goldfields, Sonoma sunshine, Sebastopol meadowfoam, and many-flowered navarretia.

Listing History. Burke's goldfields, Sonoma sunshine, and Sebastopol meadowfoam were proposed for Federal listing as endangered on June 6, 1990 (55 **FR** 23109) and were federally listed as endangered on December 2, 1991 (56 **FR** 61173). Many-flowered navarretia was proposed for federal listing as endangered on December 19, 1994 (59 **FR** 65311) and was

federally listed as endangered on June 18, 1997 (62 **FR** 34029). Critical habitat has not been designated for any of these four species.

Description. Burke's goldfields is an annual in the sunflower family (Asteraceae). Plants are less than 30 centimeters (cm) (11.8 inches (in)) tall (Hickman 1993) and usually branched (California Native Plant Society (CNPS) 1977*a*). Oppositely arranged leaves are less than 5 cm (2 in) long, linear, and usually pinnately lobed (feather-like, with two rows on opposite sides of an axis). Daisy-like flower-heads are yellow with separate involucre bracts (leaf-like structures beneath the flower head, phyllaries). Fruits of Burke's goldfields are achenes (dry, one-seeded fruits) less than 1.5 millimeters (mm) (0.06 in) long, crowned with one long awn (bristle) and numerous short scales (CNPS 1977*a*, Hickman 1993). 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 number of awns from a Lake County population. These differences in morphology along with the need to preserve Burke's goldfields throughout its range are part of the rationale for the area-based mitigation specified above (Mitigation section above). Burke's goldfields can be distinguished from smooth goldfields (*Lasthenia glaberrima*) because smooth goldfields has partly fused involucre bracts (phyllaries) and a pappus (ring of scale-like or hair-like projections at the crown of an achene) of numerous narrowed scales. The linear leaves without lobes distinguish common goldfields (*Lasthenia californica*) from Burke's goldfields (Hickman 1993).

Sonoma sunshine is an annual in the sunflower family (Asteraceae). Plants are less than 30 cm (11.8 in) tall with alternate, linear leaves (CNPS 1977*b*, Hickman 1993). The lower leaves are entire, and the upper leaves have one to three lobes that are 1 to 3 cm (0.4 to 1.2 in) deep (Hickman 1993). The daisy-like flower heads of Sonoma sunshine are yellow. The ray flowers (the flowers usually located on the edge of the inflorescence of members of the aster family) have dark red stigmas (female reproductive parts). The disk flowers (flowers in the center portion of an inflorescence of a member of the aster family) have white stigmas and white pollen but are otherwise yellow. Achenes are 3 to 4 mm (0.1 to 0.15 in) long with small rounded or conic protuberances (papillate) and 4 to 6 strongly angled edges (CNPS 1997b, Hickman 1993). Sonoma sunshine could be confused with common stickyseed (*Blennosperma nanum*); however, Sonoma sunshine has many fewer, much longer lobes on the leaves and is more robust (CNPS 1977*b*).

Sebastopol meadowfoam is an annual in the meadowfoam family (Limnanthaceae). Plants are less than 30 cm (11.8 in) tall with erect to spreading stems (decumbent). Mature plants have once pinnately-divided leaves with three to five leaflets (Hickman 1993). The shape of the mature leaves separates Sebastopol meadowfoam from other members of the genus. Showy white flowers are borne singly at the ends of stems (56 **FR** 61173), are wheel-like or bell-shaped, and have five, 12 to 18 mm (0.5 to 0.7 in) petals. The seed-like dry fruits are nutlets about 3 to 4 mm (0.1 to 0.15 in) in length (Hickman 1993).

Many-flowered navarretia is an annual in the phlox family (Polemoniaceae). Plants grow to a height of 1 to 3 cm (0.4 to 1.2 in) and are many-branched and spreading, forming a mat 2 to 6 cm (0.8 to 2.4 in) wide. Two to 4 cm (0.8 to 1.6 in) long leaves are entire and linear or have a few

widely-spaced linear lobes. Twenty to 50 pale blue flowers make up the inflorescence. Each inflorescence is subtended by leaf-like bracts that are one to two times the length of the flower head. The funnel-shaped corolla is 5 to 6 mm (0.20 to 0.24 in) long with unbranched veins (CNPS 1987, Hickman 1993). Many-flowered navarretia is distinguished from few-flowered navarretia (*Navarretia leucocephala* ssp. *pauciflora*) by its more numerous and multi-flowered heads (20 to 50 flowers versus 2 to 5), and by having three or more pairs of outer bracts with the bract lobes being forked or three-four branched from the base. It is distinguished from other *Navarretia* species in the region where it grows by its stature, degree of hairiness, or size, number, or lobing of floral parts (62 **FR** 34029).

Historical and Current Distribution. Burke's goldfields is endemic to the central Coastal Range region and has been reported historically from Mendocino, Lake, and Sonoma counties (CNPS 1977*a*, Patterson *et al.* 1994). The type locality of Burke's goldfields is the only known occurrence from Mendocino County and is possibly extirpated. Two California Natural Diversity Data Base (CNDDB) occurrences are recorded from Lake County, at Manning Flat and at a winery on Highway 29. Both Lake County occurrences are presumed extant. The remaining 25 occurrences are from Sonoma County. Four of the Sonoma County occurrences are extirpated, and two are possibly extirpated (CNDDB 1998). Within Sonoma County, one occurrence is known from north of Healdsburg (Patterson *et al.* 1994). 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).

Sonoma sunshine occurs only in Sonoma County. In the Cotati Valley, the species ranges from near the community of Fulton in the north to Scenic Avenue between 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 (56 **FR** 61173). Sonoma sunshine is currently known from 23 CNDDB occurrences (CNDDB 1998). Five occurrences are outside the Santa Rosa Plain in Sonoma Valley. Of these, two are extirpated. Eighteen occurrences of Sonoma sunshine are known from the Santa Rosa Plain. One is extirpated, one possibly extirpated and sixteen presumed extant (CNDDB 1998). Occurrences of Sonoma sunshine are found in two concentrations on the Santa Rosa Plain, one north and one south of Airport Boulevard (CH2M Hill 1995, CNDDB 1998).

Until 1992 when a small colony was found in Napa County, Sebastopol meadowfoam was thought to be a Sonoma County endemic (Patterson *et al.* 1994). The one Napa County occurrence is at Yountville Ecological Reserve, north of the Napa River (CNDDB 1998). It has been suggested that this occurrence may be introduced (Skinner and Pavlik 1994). The remaining 36 occurrences of Sebastopol meadowfoam are in Sonoma County (CNDDB 1998) where it ranges from near the community of Grafton, east to Santa Rosa, southeast to Scenic Avenue, and southwest to Cunningham (56 **FR** 61173). Three occurrences north of Grafton have not been relocated in the most recent surveys. Two Sonoma County occurrences are outside the Santa Rosa Plain, one at Atascadero Creek Marsh west of Sebastopol and one in the vicinity of Knights Valley northeast of Windsor (CNDDB 1998). On the Santa Rosa Plain, Sebastopol meadowfoam is primarily distributed in the central and southern portion of the Plain (CH2M Hill 1995). Thirty of the 37 occurrences are presumed extant. Twenty-eight of these are on the Santa Rosa Plain (CNDDB 1998).

Many-flowered navarretia is found in Lake and Sonoma counties (CNDDB 1998). The species is historically known from eight locations. Two historical populations in Sonoma County are considered possibly extirpated and were hybrids between many-flowered navarretia and Baker's navarretia (*Navarretia leucocephala* ssp. *bakeri*). Only one location is known from the Santa Rosa Plain; the site is south of the City of Windsor (CH2M Hill 1995). Five extant populations are found in Lake County (A. Day, 1993 *in litt.*, 62 **FR** 34029).

Habitat. Burke's goldfields grows in vernal pools and wet meadows below 500 meters (m) (1640 feet (ft)) (Hickman 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 (56 **FR** 61173, CNDDB 1998). At this location, the species is associated with common goldfields and few-flowered navarretia (CNDDB 1998). In Sonoma County, the vernal pools containing Burke's goldfields form on nearly level to slightly sloping loams, clay loams, and clays. A clay layer or hardpan approximately 0.6 to 0.9 m (2 to 3 ft) below the surface restricts downward movement of water (56 **FR** 61173). North of the Santa Rosa Flood Control Channel, where much of the Burke's goldfields grows on the Santa Rosa Plain, Huichica loam is the predominant soil series (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).

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, as described for Burke's goldfields above (56 **FR** 61173). 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. Soil differences are well known to be associated with genetic differentiation, even across short spatial distances (Linhart and Grant 1996). The presence of two concentrations of populations of Sonoma sunshine and their occurrence on different soil types is one basis for the area-based mitigation specified above (Mitigation section above).

Sebastopol meadowfoam grows in wet meadows and vernal pools (Hickman 1993, Skinner and Pavlik 1994). The one Napa County occurrence is in riparian woodland associated with dubious rush (*Juncus dubius*), pointed rush (*Juncus oxymeris*), plantain (*Plantago* sp.), prairie trefoil (*Lotus purshianus*), cutleaf geranium (*Geranium dissectum*), and Himalayan blackberry (*Rubus discolor*) (CNDDB 1998). At the Sonoma County occurrence near Knights Valley, Sebastopol meadowfoam grows in a vernally wet grassland. Kenwood Marsh checkerbloom (*Sidalcea oregana* ssp. *valida*), also a federally-listed species, is found nearby in freshwater wetland at this site. On the Santa Rosa Plain, Sebastopol meadowfoam occurs in vernal pools on nearly level to slightly sloping loams, clay loams, and clays, as described above (56 **FR** 61173). Most confirmed occurrences of Sebastopol meadowfoam on the Santa Rosa Plain are south of the

Santa Rosa Flood Control Channel and they are likely growing on Wright loam or Clear Lake clay, as described above (Patterson *et al.* 1994, CNDDB 1998).

Burke's goldfields, Sonoma sunshine, and Sebatopol meadowfoam are all associated with other plants that commonly grow in vernal pools on the Santa Rosa Plain. These include Douglas' pogogyne (*Pogogyne douglasii* ssp. *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).

Many-flowered navarretia is found in moist habitats in volcanic ash vernal pool systems (CH2M Hill 1995). This unique type of pool has a substrate of volcanic ash or rubble with an underlying clay hardpan. The surrounding vegetation may consist of yellow pine (*Pinus ponderosa*), black oak (*Quercus kelloggii*), Douglas-fir (*Pseudotsuga menziesii*), and madrone (*Arbutus cuspidata*). Close associates include other vernal pool plants such as Vasey's coyote-thistle (*Eryngium vaseyi*), cuspidate or toothed downingia (*Downingia cuspidata*), Boggs Lake hedge-hyssop (*Gratiola heterosepala*), and slender Orcutt grass (*Orcuttia tenuis*) (CNPS 1987).

Life History. Like many vernal pool plants (Zedler 1990), Burke's goldfields, Sonoma sunshine, Sebastopol meadowfoam, and many-flowered navarretia are annual herbs (Hickman 1993, Skinner and Pavlik 1994). Burke's goldfields usually flowers from April to June, Sonoma sunshine from March to April, Sebastopol meadowfoam from April to May, and many-flowered navarretia from May to June (Skinner and Pavlik 1994). Burke's goldfields is known to be obligately outcrossing (Crawford and Ornduff 1989), but breeding system information is lacking for the other species. Some species of *Limnanthes* and *Blennosperma* are pollinated by bees specific to particular species. For example, meadowfoam species may be pollinated by specialist andrenid bees (principally *Andrena limnanthes*) which forage within very limited areas of their host flowers (Thorp 1990). The extent to which pollination of the species covered in this biological opinion depends on host-specific or more generalist pollinators is currently unknown.

Seed banks are thought to be of particular importance in annual species subject to uncertain or variable environmental conditions (Cohen 1966, 1967; Parker *et al.* 1989; Templeton and Levin 1979). The four plants covered in this programmatic fit these criteria; 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.

Natural soil seed banks of the listed plant species have not been specifically examined. However, there is one example providing circumstantial evidence for persistent seed banks in Sebastopol meadowfoam. The Bennett site, remote from other Sebastopol meadowfoam colonies, lacked flowering populations of this species for several years. Conditions were highly degraded during this period by wallowing of hogs. The first year after removal of hogs in the mid-1990s, a small population (12 plants) of Sebastopol meadowfoam emerged at the site. The population expanded rapidly over several years (P. Baye, 1998 *in litt.*). Seed banks are the likely source of the Sebastopol meadowfoam that emerged because long-distance dispersal is an improbable explanation for the simultaneous emergence of multiple plants at one site.

For species that develop substantial seed banks, a census of plants growing above ground may not accurately estimate the number of plants at the site (Rice 1989, Given 1994). Population sizes of short-lived species may fluctuate widely from very high numbers in some years to very small numbers, or even absence, in other years. Therefore, total extirpation should not be assumed when above ground plants are not observed at a site. Further, declines in population size may not necessarily indicate that habitat is unsuitable (Given 1994).

Reasons for Decline and Threats to Survival. Burke's goldfields is threatened throughout all or part of its range by factors including urbanization, agricultural land use changes, alterations in hydrology, and erosion (CNPS 1977*a*, 56 **FR** 61173, Patterson *et al.* 1994, CH2M Hill 1995, CNDDB 1998). The only known Mendocino County occurrence is presumably extirpated (CH2M Hill 1995). The Manning Flat occurrence in Lake County is the largest known occurrence of the species and is threatened by extensive gully erosion that is destroying the habitat (CH2M Hill 1995, CNDDB 1998). The second Lake County occurrence is on property owned by a winery. Recent reports suggest that some damage to the occurrence has resulted from vineyard operations (R. Chan, University of California, Berkeley, 1998 *in litt.*). However, the winery owners appear willing to work with the Service and the Corps to avoid and/or minimize further damage to the site (CDFG, 1998 *in litt.*, N. Haley, U.S. Army Corps of Engineers, 1998 pers. comm.). Within the Santa Rosa Plain, many Burke's goldfields locations have been extirpated due to urbanization and conversion of land to row crops. Formerly well-represented in the vicinity of Windsor on the Plain, Burke's goldfields has now been nearly extirpated from the area (Patterson *et al.* 1994, CH2M Hill 1995). Threats to the Santa Rosa Plain portion of the species are discussed in more detail in the Environmental Baseline section.

Like Burke's goldfields, Sonoma sunshine is threatened throughout all or part of its range by factors including urbanization, agricultural land use changes, and alterations in hydrology (56 **FR** 61173, Patterson *et al.* 1994, CH2M Hill 1995, CNDDB 1998). In the Sonoma Valley, two of five known occurrences have been extirpated. One was extirpated by habitat destruction in 1986, and the area is now a vineyard. At the second site, most habitat was destroyed by grading for homesites in 1980; the remainder was converted to vineyard or overtaken by weeds (CNBBD 1998). Of the presumed extant Sonoma Valley occurrences, one has been largely developed. A small lot was retained by CDFG when the development took place, but Sonoma sunshine disappeared on the lot after the subdivision was developed (Service files). A second Sonoma Valley occurrence is currently pasture. A portion of the occurrence may have been recently disced, and the landowners of a second portion want to convert the site to vineyard (C. Wilcox, 1998, pers. comm.; Service files). The third Sonoma Valley occurrence is in Sonoma Valley Regional Park, a park which is apparently not managed for conservation (CNDDB 1998). On the Santa Rosa Plain, one occurrence has probably been extirpated by completion of a subdivision and one by major alterations of the land at the site (CNDDB 1998). Of the presumed extant sites, a number support severely degraded habitat, are threatened by development, or have not supported confirmed populations of Sonoma sunshine in recent years (CH2M Hill 1995, CNDDB 1998). Threats to the Santa Rosa Plain portion of the species are discussed in more detail in the Environmental Baseline section.

Like Burke's goldfields and Sonoma sunshine, Sebastopol meadowfoam is threatened throughout all or part of its range by factors including urbanization, agricultural land use

changes, and alterations in hydrology (56 **FR** 61173, Patterson *et al.* 1994, CH2M Hill 1995, CNDDB 1998). The one Napa County occurrence is within a California Department of Fish and Game ecological reserve but may be threatened by invasion of Himalayan blackberry (CNDDB 1998). In Sonoma County, outside the Santa Rosa Plain, one occurrence was possibly extirpated in 1974, and the second is on private land where bordering properties have largely been converted to vineyard. The most recent available information suggests that the property with Sebastopol meadowfoam is grazed (CNDDB 1998). Thirty-four CNDDB occurrences of Sebatopol meadowfoam are on the Santa Rosa Plain. Two of these are extirpated, one by conversion to a turf farm in 1991. Four more occurrences are possibly extirpated (CNDDB 1998). A number of the remaining locations on the Santa Rosa Plain have been severely degraded; many of the extant colonies are small and severely threatened (CH2M Hill 1995). Threats to the Santa Rosa Plain portion of the species are discussed in more detail in the Environmental Baseline section.

Because it is endemic to volcanic ash substrate vernal pools, many-flowered navarretia has an extremely limited distribution (McCarten 1985). Urbanization, invasion of exotics, and off-highway vehicle use have contributed to the decline of the species (62 **FR** 34029). One of the historic occurrences in Sonoma County, east of the City of Santa Rosa at Ledson Marsh (Bennett Mountain Lake), was severely affected by horseback riders, wild pigs, and a *Eucalyptus* eradication program (CH2M Hill 1995). The one extant population of many-flowered navarretia that is known from within the action area is addressed in the Environmental Baseline section.

The four species addressed in this biological opinion were listed as endangered primarily because of the loss and degradation of habitat throughout their ranges. Since their listing, seasonal wetland habitat has continued to decline throughout the species' ranges.

Recovery. Protection and adaptive management of known sites or populations is of high priority for recovery of the listed plant species on the Santa Rosa Plain. However, because much of the habitat for the listed plant species on the Santa Rosa Plain has been lost, and the remainder is highly fragmented (as further described in the Environmental Baseline section below), preservation alone will be insufficient to ensure long-term survival and recovery of the listed species. Long-term survival and recovery will only be achievable if substantial wetland restoration is completed, followed by reintroduction of self-sustaining, viable populations of the listed plants. Some large sites with proportionately small wetland acreage may be highly suitable, or even essential, for recovery of the listed species. In the absence of a full suite of reserves, including large reserves based on both preservation and restoration, there is potential for significant loss of opportunity to restore wetlands and recover the species. Because maintenance of restorable seasonal wetland habitat and habitat suitable for reintroduction will be necessary for long-term survival and recovery of the listed plant species on the Santa Rosa Plain, this programmatic opinion addresses effects to restorable seasonal wetlands and suitable unoccupied habitat, in addition to currently or formerly occupied habitat. During the interim program, mitigation is required for all impacts to seasonal wetlands, and impacts to seasonal wetlands are limited to 50 acres. Regional conservation planning is expected to identify all suitable and restorable habitat that will be protected to assure long-term survival and recovery of the listed plant species.

Environmental Baseline

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 impacts is discussed briefly below.

Stream channelization for flood control, such as of Roseland and Colgan Creeks, has involved excavation through vernal pool terrain causing interruption of hydrological connections and filling of wetlands with dredge spoils. Pools have also been filled and drained for mosquito abatement and to create dry ground for livestock. Air photo analyses and reconnaissance surveys have revealed incidences of unauthorized low level backyard filling throughout the action area (Patterson *et al.* 1994).

Livestock grazing is another factor with historic and ongoing effects on the listed plant species of the Santa Rosa Plain. While light grazing may benefit habitat by reducing thatch and minimizing competitive grasses (this has been demonstrated to be an effective strategy for Burke's goldfields), heavier grazing can result in injurious trampling, direct plant consumption,

local soil compaction, and detrimental effects resulting from the excessive contribution of manure (Patterson *et al.* 1994, 56 **FR** 61173).

Wastewater irrigation is a recently established factor affecting vernal pools on the Santa Rosa Plain. This practice began in the 1970s and 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. The draft EIR stated that wastewater irrigation would avoid impacts to sensitive biological resources (City of Santa Rosa and U.S. Army Corps of Engineers 1996). However, in February of 1998, the site supporting many-flowered navarretia had a sign stating wastewater was being used for irrigation on-site (Ellen Berryman, 1998 pers. obs.). Patterson *et al.* (1994) state, "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" (page 47).

Burke's goldfields

Burke's goldfields was listed as endangered on December 2, 1991 (56 **FR** 61173), largely because of present and threatened destruction and modification of its habitat. 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. The Service is 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 these sites declined after the disturbance took place. In addition, the Service is aware of at least four instances of unauthorized discing that have triggered Corps enforcement actions for sites where Burke's goldfields grows. Because of typically small parcel size, development projects that have proceeded since listing, such as Cobblestone and TMD Brown, 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 most severely impacted portion of the range of Burke's goldfields has been the northwestern portion of the 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 (B. Guggolz, CNPS, 1998 pers. comm.). 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 (B. Guggolz, 1998 pers. comm.).

Since the time Burke's goldfields was listed in 1991, the species has continued to experience dramatic loss. The Service used data from 1994 (Patterson *et al.* 1994) to examine how numbers of Burke's goldfields plants 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. Figure 2 shows data compiled for sites surveyed both before and after listing. 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 we have both pre- and post-listing surveys decreased in size after the species was listed (Figure 2, significantly more sites decreased than expected due to chance alone, $p < 0.02$, sign test). 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).

Only about 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 since 1987 at Todd Road Preserve, the largest of the preservation sites (Patterson *et al.* 1994, CH2M Hill 1995). Excluding this site, the preserved acreage of Burke's goldfields sites is only 8 percent of acreage known in 1994 (calculated from data in Patterson *et al.* 1994). Since 1994, one preservation bank with Burke's goldfields has been established, but only a small portion of the site supports Burke's goldfields (Exhibit A, MOA for Wright Preservation Bank, 1997).

Sonoma sunshine

Sonoma sunshine was listed as endangered on December 2, 1991 (56 **FR** 61173), primarily because of present and threatened destruction and modification of its habitat. Patterson *et al.* (1994) estimated less than 12 biologically separate populations remain. Of the sites they examined, nearly one-third had been extirpated, and nearly one-sixth had not been confirmed recently. An additional 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 Cobblestone and TMD Brown. Other sites have been used as wastewater irrigated pastures, damaged by 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 that triggered Corps enforcement actions (Service files).

The Service used data from 1994 (Patterson *et al.* 1994) to examine how numbers of Sonoma sunshine plants at particular sites changed between the time of listing and the most current surveys that had been performed after listing. Figure 3 shows data compiled for sites surveyed both before and 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). Since 1994, one preservation bank with Sonoma sunshine has been established, but only 15 individual plants have been observed in recent surveys at the site (M. Waaland, 1998 pers. comm.).

Sebastopol meadowfoam

Sebastopol meadowfoam was listed as endangered on December 2, 1991 (56 **FR** 61173) primarily because of present and threatened destruction and modification of its habitat. 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 the southwest Santa Rosa annexation area. 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 Sebatopol meadowfoam sites known from the Santa Rosa Plain in 1994 (calculated from data in Patterson *et al.* 1994). Since 1994, two preservation banks with Sebastopol meadowfoam have been established (MOA for Wright Preservation Bank 1997, MOA for Southwest Santa Rosa Vernal Pool Preservation Bank 1997).

Many-flowered navarretia

Many-flowered navarretia is found in only one location on the Santa Rosa Plain (CH2M Hill 1995, CNDDB 1998). Habitat at the site has been heavily disturbed due to sheep grazing

(M. Waaland, 1988 *in litt.*) and may be threatened by wastewater irrigation (E. Berryman, 1998 pers. obs., see above). No populations of many-flowered navarretia are protected in Sonoma County (Patterson *et al.* 1994). The species was listed as endangered on June 18, 1997 (62 **FR** 34029) because habitat loss and degradation were found to imperil the species.

Summary

More than 84 percent of the once extensive vernal pool ecosystem on the Santa Rosa Plain has been lost. Numerous sites supporting the listed species covered in this programmatic have been destroyed or severely degraded by urbanization and other land conversion activities. The remaining habitat is highly fragmented, and the majority of sites known to support the listed species are small (less than 15 acres) (calculated from data of Patterson *et al.* 1994). The past and present impacts to listed plant species habitat on the Santa Rosa Plain are summarized in the following passage:

> Virtually all of the land and all of the wetlands in the study area have been at least moderately altered by past or ongoing land uses, and large sections of the plain's overall habitat landscape have been completely converted to cropland or other intensive non-wetland use. With severe depletion of overall habitat acreage and pervasive degradation, even the remnant habitats no longer represent more than a fraction of what they once did as part of the regional ecosystem ...current efforts must recognize the meager remaining universe within which any planned conservation/preservation efforts must take place.
>
> Patterson *et al.* 1994, p. 49

Effects of the Proposed Action

A. Interim Program for Low-quality Habitat

As described in the Status of the Species and Environmental Baseline, above, habitat for the listed plant species has been severely impacted 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.

Prior to establishment and implementation of a comprehensive conservation plan, 404 permitting authorized under this programmatic consultation is expected to result in direct and indirect impacts to 50 acres of low-quality seasonal wetlands, 30 of which may be occupied (or assumed occupied) by the listed plants. These impacts 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. Projects authorized under this consultation are also likely to

result in fragmentation and edge effects to existing habitat. The loss of low-quality 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.

Impacts to seasonal wetlands, both in habitat currently suitable for the listed plant species and in restorable habitat, will be limited and mitigated to allow for the species' long-term survival and recovery. Direct and indirect impacts to the 30 acres of seasonal wetlands where the listed species have been observed, or where they are assumed to be present, will be mitigated through 2:1 to 3:1 preservation and 1:1 to 1.5:1 restoration/construction. Direct and indirect impacts to potential habitat where adequate surveys have been conducted and the listed species have not been observed will be mitigated through 1:1 to 2:1 preservation and 1:1 to 1.5:1 restoration/construction. The mitigation land will be preserved and managed in perpetuity.

Impacts to seasonal wetlands allowed under this programmatic consultation could result in loss of habitat where the plant species have not been detected for a number of years, but where viable seed banks persist on-site. However, these impacts will be addressed through the programmatic consultation by requiring compensation for seasonal wetland impacts even when plants have not been detected on-site. Any habitat with historic records of the species will be compensated in the same manner as habitat known to be currently occupied.

Fill of seasonal wetlands authorized under this consultation could result in disproportionate impacts within some portions of the action area. This could result in the reduction in extent of a species range and a loss of genetic variability. To minimize geographically disproportionate impacts, the action area is divided into three geographic units, and impacts within each unit must be mitigated within the same unit. This area-based mitigation will provide for habitat preservation throughout the ranges of the listed species in the planning area. Since each species is concentrated in different geographic units, area-based mitigation is also expected to maximize the opportunity to mitigate in-kind for each species.

The loss of 50 acres of low-quality seasonal wetlands is not likely to jeopardize the continued existence of Burke's goldfields, Sebastopol meadowfoam, Sonoma sunshine, or many-flowered navarretia in the wild, because this habitat loss will be offset through preservation of existing higher quality habitat and restoration/construction of additional habitat, and the impacts will be re-evaluated twice annually to determine whether this strategy should be modified. Through the tracking of project impacts over time, periodic reevaluation of the biological opinion, and modification of the opinion if it is determined the permitted actions may cumulatively jeopardize the species, effects will be further minimized at local and regional levels. The comprehensive review of the baseline (the number and location of acres destroyed within each county and success rate of restoration efforts) that will be conducted at the end of each six-month period will limit the extent of impacts that occur as a result of the program's implementation. During these reviews it may be determined that habitat destruction can continue with the same or otherwise necessary mitigation processes in place, or that further destruction in specific areas will jeopardize listed species. Once the 50-acre threshold for the interim program has been reached, the Service does not expect to reinitiate consultation and increase the threshold until a comprehensive conservation planning program is in place.

B. Comprehensive Conservation Planning Program

The comprehensive conservation planning program outlined in this programmatic consultation would establish an adaptively managed regional preserve system for the listed plant species, while allowing for impacts to seasonal wetlands outside the preserve system. This program would incorporate the goals and objectives of Phase 2 of the VPEPP, resulting in an adaptively managed preserve system that would 1) include large, resilient core populations of the species; 2) include an array of smaller, peripheral populations to maximize genetic diversity and minimize potential effects of catastrophic outbreaks of herbivorous insects or pathogenic fungi that may sweep through larger populations; 3) provide for experimental introduction of the listed plants with the goal of establishing a sufficient number of stable populations that will offset loss occurring outside the preserve system; and 4) be adaptively managed to provide for the long-term survival of the species. The issuance of any 404 permits in the context of such a program would not jeopardize the continued existence of the listed plant species because the program would be designed to provide for the species' long-term survival and recovery.

Cumulative Effects

Cumulative effects include the effects of future State, Tribal, local or private actions reasonably certain to occur in the action area considered in this biological opinion. Future Federal actions, unrelated to the proposed action, are not considered in this section because they require separate consultation pursuant to section 7 of the Act.

Because the listed plants occur in seasonal wetlands, many of the activities expected to affect the species will be reviewed under this programmatic consultation or individual section 7 consultations as a result of the Federal nexus provided by section 404 of the Federal Water Pollution Control Act, as amended (i.e., Clean Water Act). Some activities that do not require a 404 permit could occur that would negatively impact the listed plant species, including excessive grazing and wastewater irrigation. 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, non-native plant species, but grazing could increase to a detrimental level in the future. The cessation of grazing might also have a negative effect on the species, since non-native competitors have invaded the species' habitat and grazing may currently play an essential role in controlling these competitors. The impacts to vernal pools on the Santa Rosa Plain resulting from wastewater irrigation are expected to continue increasing. The Sub-regional Sewage Treatment System requires at least 100 additional acres of land on the Santa Rosa Plain annually to meet the demand for wastewater disposal. On-going urban growth in Windsor as of 1994 was expected to add pressure to the Windsor Water District to expand reclaimed water irrigation to at least 1,000 acres in the northern portion of the action area (Patterson *et. al* 1994). The long-term conservation plan to be developed as a component of this programmatic consultation is intended to result in establishment of a regional preserve system that will be managed to maintain the long-term viability of the listed plant species, which is expected to significantly reduce these cumulative effects.

Conclusion

After reviewing the current status of the species, the environmental baseline for the action areas, the effects of the proposed action, and the cumulative effects, it is the Service's biological opinion that projects which meet the qualifications for this programmatic consultation are not likely to jeopardize the continued existence of the Burke's goldfields, Sebastopol meadowfoam, Sonoma sunshine, or many-flowered navarretia. No critical habitat has been designated for these species, therefore, none will be affected.

INCIDENTAL TAKE STATEMENT

Section 9 of the Act and Federal regulation pursuant to section 4(d) of the Act prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined as 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 impairing behavioral patterns including breeding, feeding, or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the Act provided that such taking is in compliance with this Incidental Take Statement.

Sections 7(b)(4) and 7(o)(2) of the Act do not apply to the incidental take of listed plant species. However, protection of listed plants is provided to the extent that the Act requires a Federal permit for removal or reduction to possession of endangered plants from areas under Federal jurisdiction, or for any act that would remove, cut, dig up, or damage or destroy any such species on any other area in knowing violation of any regulation of any State or in the course of any violation of a State criminal trespass law.

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 recommendations provided here relate only to the proposed action and do not necessarily represent complete fulfillment of the agency's 7(a)(1) responsibilities for these species.

1. As the Central Valley Vernal Pool Multiple Species Recovery Plan is developed, the Corps should assist the Service in its implementation for listed plant species on the Santa Rosa Plain.

2. The Corps should work with the Service to encourage the local jurisdictions of the Santa Rosa Plain to participate in the interim and long-term program outlined in this consultation, and in assisting the local jurisdictions through the interim and long-term planning processes.

REINITIATION NOTICE--CLOSING STATEMENT

This concludes formal consultation on the actions described in this opinion. 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 retained (or is authorized by law) and if: (1) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; (2) the agency action is subsequently modified in a manner that causes an effect to listed species or critical habitat that was not considered in this opinion; or (3) a new species is listed or critical habitat is designated that 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. In addition, if the Corps discovers that the conditions of the permit have not been followed, the Corps should review its responsibilities under section 7 of the Act and reinitiate formal consultation with the Service. We appreciate the cooperation of the Corps throughout this consultation process.

If you have any questions regarding this biological opinion, please contact Diane Elam, Ellen Berryman, or Jan Knight of my staff at (916) 979-2120.

Sincerely,

William E. Fickman

for David L. Harlow
Acting Field Supervisor

Enclosures (Appendix A)

cc: AES, Portland, OR
CESAC, Regulatory Branch
EPA, Suzanne Marr
CDFG, Region 3

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APPENDIX A

Guidelines for Conducting and Reporting Botanical Inventories for Federally Listed Plants on the Santa Rosa Plain

(modified from the September 23, 1996 Service Guidelines for Conducting and Reporting Botanical Inventories for Federally Listed, Proposed and Candidate Plants)

These guidelines describe protocols for conducting botanical surveys for federally listed plant species on the Santa Rosa Plain. They also describe minimum standards for reporting results of the surveys. The federally listed plant species occurring on the Santa Rosa Plain are Sonoma sunshine (*Blennosperma bakeri*), Burke's goldfields (*Lasthenia burkei*), Sebastopol meadowfoam (*Limnanthes vinculans*), and many-flowered navarretia (*Navarretia leucocephala* ssp. *plieantha*). The Service will use, in part, the information outlined below in determining whether the project under consideration may affect these plants, and in determining the direct, indirect, and cumulative effects.

Field inventories should be conducted by a qualified botanist in a manner that will locate listed species that may be present. With the exception of developed agricultural lands, the entire project area should be surveyed. Acceptable survey protocols are as follows:

1. A minimum of three visits must be made to the project site during the growing season. Site visits must correspond to times when at least one of the four Santa Rosa Plain listed plant species is accurately identifiable on a local reference site. Reference sites used must be acceptable to the Service. Site visits must span a period during which all four of the listed plants have been observed (not necessarily at the same time) and are identifiable on reference sites during a specific growing season. More visits to the site or the adjacent area may be needed to determine when each species is blooming in a given year. Inventories will include all potential habitats at the project site.

2. A minimum of two years of negative survey data performed according to the specifications in #1 is necessary to substantiate a negative finding for future permitting actions. For cases in which negative survey data do not conform to the standards outlined in these guidelines, the Service will make the assumption that all four listed plant species are present on the project site.

3. List every species observed and compile a comprehensive list of vascular plants for the entire project site. Vascular plants need to be identified to a taxonomic level which allows rarity to be determined.

4. Survey documentation must include:

   a. identification of reference sites visited, which listed species were observed, phenological stage of the listed species observed, and similarity of physiographic control between reference sites and surveyed sites (general water depth, extent of pooling, etc.)

   b. a description of the biological setting at the project site, including plant community, topography, soils, potential habitat of target species, and environmental conditions, such as timing or quantity of rainfall, which may influence the performance and expression of target species

   c. a map of project location showing scale, orientation, project boundaries, parcel size, and map quadrangle name

   d. survey dates and survey methodology(ies)

   e. a comprehensive list of all vascular plants occurring on the project site for each habitat type, to characterize and document site quality

   f. a description of current and historical land uses of the habitat(s) and degree of project site alteration

   g. a description of the presence of listed species off-site on adjacent parcels, if known

   h. an assessment of the biological significance or ecological quality of the project site in a local and regional context

5. If listed species is (are) found on the project site, report results that additionally include:

   a. a map showing the distribution of the listed species distribution relative to the proposed project

   b. a description of the direction and integrity of flow of surface hydrology. If listed species is (are) affected by adjacent off-site hydrological influences, describe these factors.

   c. the listed species phenology and microhabitat, an estimate of the number of individuals of each listed species per unit area; identify areas of high, medium and low density of listed species over the project site, and provide acres of occupied habitat of listed species. Investigators should provide color slides, photos or color copies of photos of listed species or representative habitats to support information or descriptions contained in reports.

   d. the degree of impact(s), if any, of the proposed project as it relates to the potential unoccupied habitat of listed species.

6. Document findings of target species by completing California Native Species Field Survey Form(s) and submit form(s) to the Natural Diversity Data Base. Documentation of determinations and/or voucher specimens may be useful in cases of taxonomic ambiguities, habitat or range extensions.

7. Report as an addendum to the original survey, any change in abundance and distribution of listed plants in subsequent years. Project sites with inventories older than 3 years from the current date of project proposal submission will likely need additional survey. Investigators need to assess whether an additional survey(s) is (are) needed.

8. Guidance from California Department of Fish and Game (CDFG) regarding plant and plant community surveys can be found in Guidelines for Assessing the Effects of Proposed Developments on Rare and Endangered Plants and Plant Communities, 1984. Please contact the CDFG Regional Office for questions regarding the CDFG guidelines and for assistance in determining any applicable State regulatory requirements.

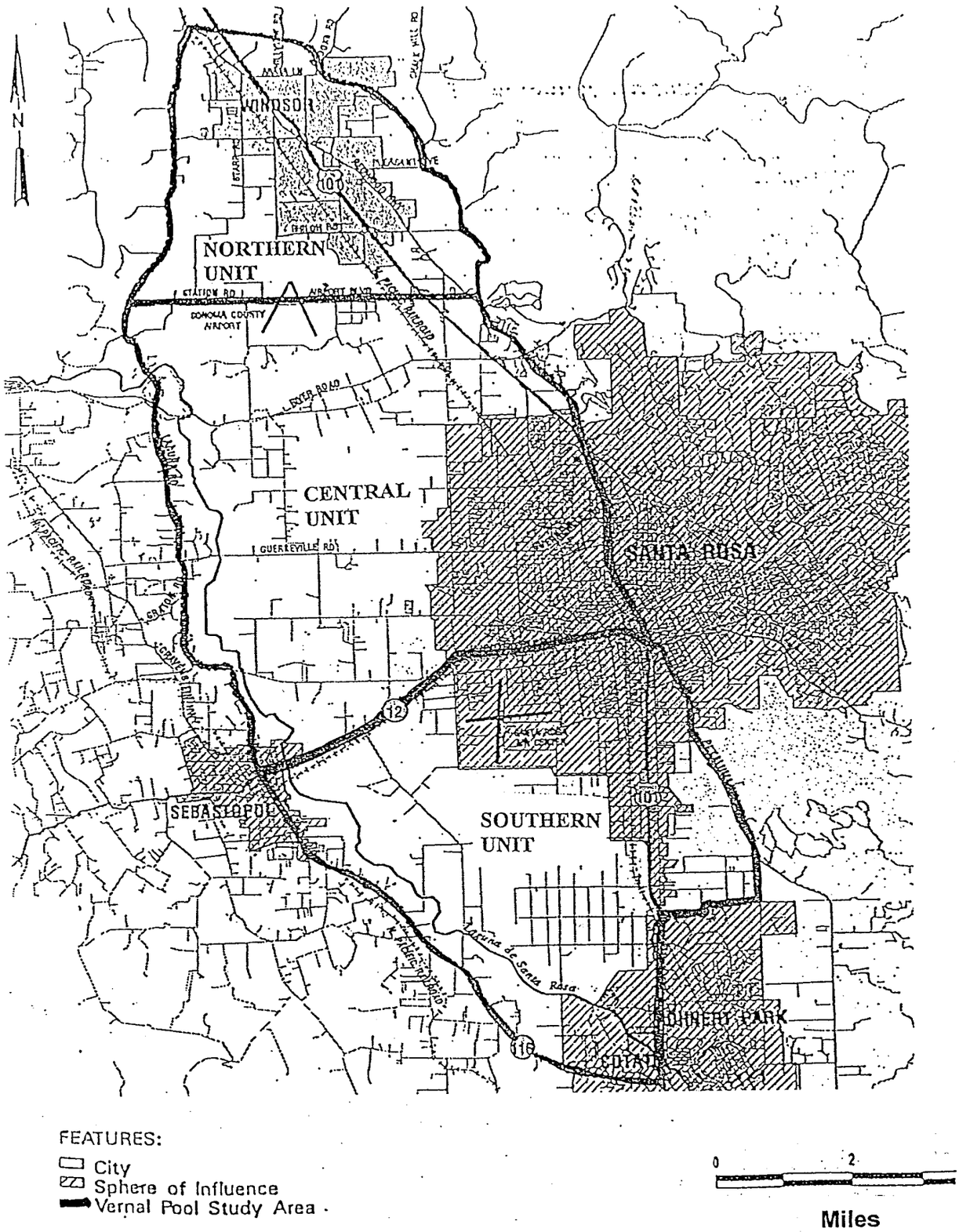

Figure 1: Santa Rosa Plain programmatic biological opinion action area and mitigation units.

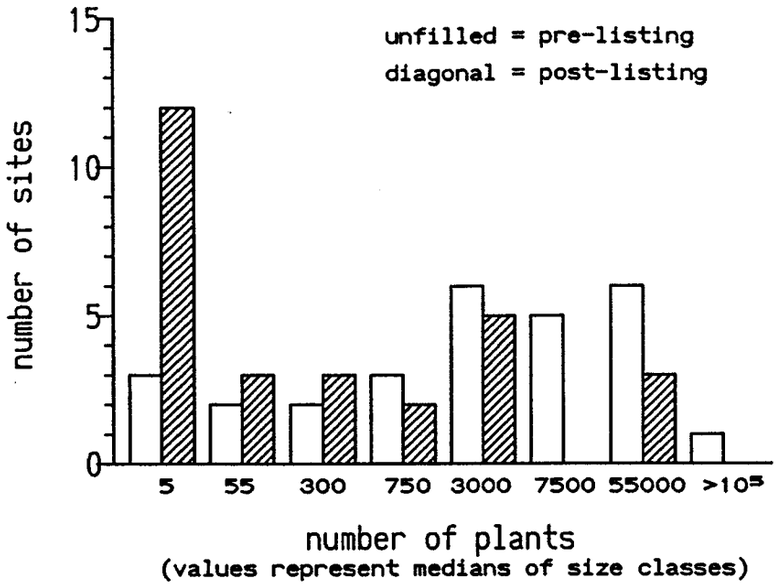

Figure 2: Number of Burke's goldfields individuals at sites surveyed both pre- and post-listing

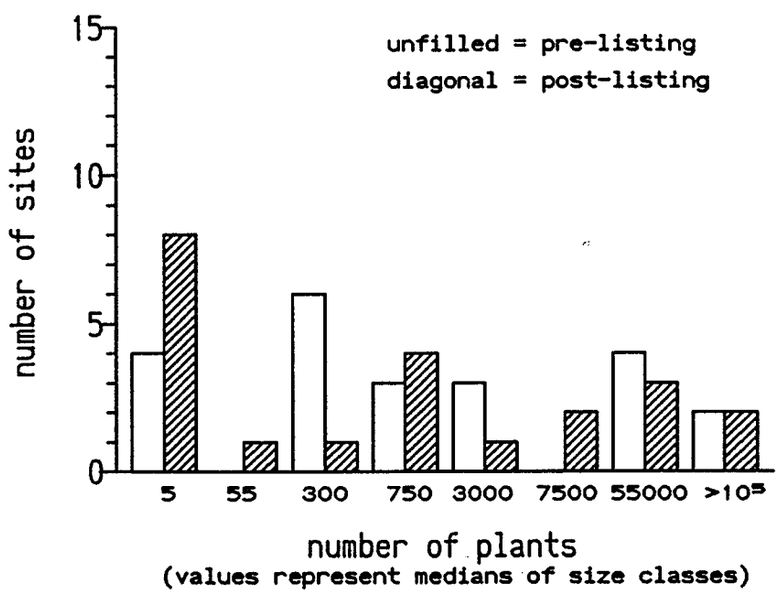

Figure 3: Number of Sonoma sunshine individuals at sites surveyed both pre- and post-listing