APPENDIX I

SANTA ROSA PLAIN CONSERVATION STRATEGY
PEER REVIEW SELECTION CRITERIA

It is the intent of the conservation strategy team to allow flexibility to the group selecting the peer reviewers, recognizing that the proposed criteria may be very hard to meet. For example, there are very few published or peer reviewed papers on the California tiger salamander (CTS). It may also be very hard to find a peer reviewer who is an expert on the Sonoma County distinct population segment of the CTS, but does not work for one of the represented agencies. However, the selection group will follow the following criteria to the greatest extent possible.

1. Good academic credentials in biology, zoology, botany or ecology with subspecialties in amphibians, vernal pool associated rare plants, conservation planning, and wildlife population dynamics.

2. Knowledge of ecology of the Santa Rosa Plain

3. Experience in the Santa Rosa Plain

4. Demonstrated expertise in CTS and listed plant biology, ecology, surveys, population, behavior, genetics, habitat designation, etc. in the Santa Rosa Plain

5. Demonstrated expertise on Sonoma population of CTS with a significant amount of field experience with the CTS

6. Experience in designing or reviewing large-scale habitat conservation efforts

7. Experience in monitoring or evaluating ongoing conservation or recovery plans, particularly near urban environments

8. Published peer review paper(s) on CTS, or listed plants

9. Expertise on vernal pool ecology (preference in Santa Rosa area) demonstrated by peer review papers or experience

10. Demonstrated expertise on vernal pool restoration, with examples provided

11. Not employed by an agency represented on the conservation strategy team

12. No financial interest in projects that may be affected by the outcome of the conservation strategy team efforts

13. Understanding of issues related to conservation of the listed species

14. Seek balance in the selected peer reviewers by including at least one specialist on the listed plants and at least one specialist on CTS

APPENDIX J

SANTA ROSA PLAIN CONSERVATION STRATEGY TEAM
QUESTIONS FOR PEER REVIEWERS

The Santa Rosa Plain Conservation Strategy Team has prepared an Administrative Draft Conservation Strategy for the Sonoma County population of the California tiger salamander (CTS) and the listed plant species (many-flowered navarretia, Sonoma sunshine, Burke's goldfields, and Sebastopol meadowfoam) located in the Santa Rosa Plain. The Team determined that it would be appropriate to have the biological components of this strategy reviewed by qualified professionals (peer reviewers).

In carrying out this review, the Team requests that each peer reviewer consider the following list of questions. This has been compiled for two reasons--first, as an indicator of the type and range of issues that arose or were confronted by the Team in preparing the strategy, and second, to identify particular biological questions to which the team would like to direct the reviewers' attention. How the questions are addressed in their analysis is left to the judgment of individual reviewers. For example, written answers to some or all the questions can be provided, or such answers may generally be incorporated into the reviewer's written analysis of the strategy. The team also asks the reviewers to identify any data or information, or the sources of any data or information, as applicable, that supports any assumptions, opinions, or conclusions reached in the course of their analysis.

1. Are the minimum preserve acreages established by the strategy for the conservation areas (see Table 1) adequate to support both CTS aestivation and breeding within these areas over the long-term? Are these preserve acreages adequate to also meet the needs of the federally listed plants? Will fragmented preserve areas, resulting from economically driven selection of noncontiguous parcels within areas of rural residential and agricultural lands, be adequate for long term preservation of CTS? Are the criteria for selecting preserve sites within areas of rural residential and agricultural lands as described in the Administrative Draft sufficient to guide the assemblage of the preserve system?

2. An economic analysis conducted in connection with the strategy provides estimates for the costs of meeting its preserve requirements which, based on proposed acreage requirements, are very considerable. Would establishing smaller minimum preserve acreages for the conservation areas, or a range of acreages within which specific minimums that would be determined through time (e.g., based on further study and Implementation Review), constitute biologically acceptable alternatives to the minimum acreages currently specified? The following alternative to Table 1 in the Conservation Strategy is provided for consideration:

Alternate Table 1:
Minimum Preserve Acre Goals[1]

Conservation Areas	Acreage of Habitat Minus Developed Land	Minimum CTS Preserve Acreage Goals[2]	Acreage of Existing Preserve Land	Minimum Acreage to be Preserved
Alton	688	350	56.1	294
Wright	678	350-450	209.7	140-240
Kelly	708	350-450	0	350-450
Llano	1748	630-900	294.2	336-606
S.W. Santa Rosa	235	230[3]	103.2	58-127
Stony Point	1396	630-900	177.5	452-722
NW Cotati	900	350-450	0	350-450
SE Cotati	941	350-450	0	350-450
SW Cotati	1637	350-450	0	350-450
TOTALS	**8931**	**3590-4630**	**550**	**2680-3789**

[1] Suggested by the private landowner community as an alternative to the approach shown in Table 1 of the conservation strategy.

[2] The upper ends of these ranges are the acreage figures provided by FWS & DFG in Table 1 of the draft strategy; the lower ends were determined by the private landowner community by computing a simple proportion based on the 350- to 500-acre range originally considered by the team as a potential range of preserve sizes; i.e., **"x"** (FWS's/DFG's figures in Table 1 of draft strategy, used to establish the high end of ranges given in 3rd column above) is to **"500"** (high end of 350-500 range) as **"y"** (quantity to be solved for to establish the low-end of the ranges suggested in 3rd column above) is to **"350"** (low end of the 350-500-acre range). Thus, taking the Wright Conservation Area as an example, the low-end of the private-landowner suggested range for this area is computed by the proportion 450/500 = y/350, or y=315; however, since 350 is the minimum allowed by the 350-500 range, 350, not 315, appears as the low-end of the range for the Wright area (similarly, 350 is the low end of the ranges for the Kelly and three Cotati areas).

[3] This figure for the S.W. Santa Rosa area is an exception to the 350-acre minimum because its purpose is primarily linkage of existing preserves to each other and to other conservation areas.

3. Would allowing up to 20% of the strategy's preserve lands to be established outside the conservation areas, under the conditions specified and assuming the preserve selection criteria are appropriately applied, be likely to result in excessive fragmentation of its overall preserve system? If so, what, if any, additional measures could be incorporated to prevent this?

4. The conservation strategy requires CTS migration corridors averaging 500 feet in width with a 200-foot minimum. Specifically corridors are identified in the Southwest Santa Rosa Conservation Area to connect existing preserves and potential preserves within the conservation area and to connect these preserves to the adjacent conservation areas. Given the size of the preserves, please comment on the potential effectiveness of such a preserve design in providing for a viable CTS population in the Southwest Santa Rosa Conservation Area. On the broader issue of corridors, (a) what generally would be a biologically acceptable corridor, length and width, (b) what attributes should the corridor have, and (c) what, if any, relevant scientific information upon which to base CTS corridor requirements is currently available? Are the proposed migration corridors

adequate for seed dispersal and genetic exchange between isolated populations of listed plant species? How would narrowing of the corridors affect this?

5. Are the measures set forth in the Administrative Draft sufficient to provide for CTS movement between conservation areas bisected by roads, streams, or flood control channels?

6. Is the Southwest Santa Rosa conservation area of sufficient size and configuration to provide a viable preserve area for CTS?

7. Are the measures outlined in the Administrative Draft adequate to facilitate migration within the proposed corridors (i.e., raised curbs, road under-crossings, or other protective measures)?

8. Do CTS migration patterns differ from population to population, and if so, what factors are thought to influence these patterns, and why?

9. Are the preserve management actions set forth in the Administrative Draft, including Appendix D, sufficient to adequately protect the preserve lands as habitat for CTS and listed plant species?

10. Are the suitability criteria set forth in the Administrative Draft sufficient to adequately identify lands that will contribute to the conservation objectives of the Conservation Strategy?

11. Are the translocation criteria set forth in the Administrative Draft, including Appendix B, sufficient to support establishment of new populations of listed plant species?

12. Are the translocation criteria set forth in the Administrative Draft sufficient to support reintroducing CTS, minimizing project impacts, and conserving the genetic diversity of CTS on the Santa Rosa Plain?

13. Was the methodology used to create Figure 2 appropriate?

14. Will the preserve areas within the collective nine conservation areas proposed in Sections 4 and 5 of the Strategy, to be secured during the expected 5-10 year period of the Strategy, be sufficient to establish long term preservation of the CTS and listed plants within the range?

15. Will the proposed Conservation Strategy yield viable conservation preserves on a time scale sufficient for CTS preservation? Are other mitigation strategies potentially more effective?

16. To address impacts to wetlands on the Santa Rosa Plain, project proponents are required to create, restore or enhance wetland on at least a 1:1 basis. Wetlands creation

results in the conversion of uplands to wetlands. Some of this conversion is expected to occur in areas occupied by CTS. Is the conversion of upland habitat to wetlands a concern? If so, what considerations should be taken in designing such projects to assure that CTS are not adversely affected?

APPENDIX K
ADMINISTRATIVE DRAFT FOR PEER REVIEW 11-16-04

SANTA ROSA PLAIN CONSERVATION STRATEGY

SECTION 1 – INTRODUCTION

1.1 Setting

The Santa Rosa Plain (Plain) is located in central Sonoma County, bordered on the south and west by the Laguna de Santa Rosa, on the east by the foothills, and on the north by the Russian River. The Plain and adjacent areas are characterized by vernal pools, seasonal wetlands, and associated grassland habitat which support the threatened California tiger salamander (CTS) and four endangered plant species: Burke's goldfields, Sonoma sunshine, Sebastopol meadowfoam, and many-flowered navarretia. (See Appendix A for species accounts.) These plants grow only in seasonal wetlands, while the CTS uses seasonal wetlands for breeding, and the surrounding uplands for aestivation. The historic range of the CTS in Sonoma County is shown in Figure 1. The distribution of Burke's goldfields, Sonoma sunshine, and Sebastopol meadowfoam is confined almost entirely to the Plain. Many-flowered navarretia occurs mostly outside the Santa Rosa Plain, but its only Sonoma County population is on the Plain.

Urban and rural growth on the Plain has taken place for over one hundred years, and for the past twenty years urban growth particularly has encroached into areas inhabited by the CTS and the plant species discussed above. The loss of seasonal wetlands caused by development on the Plain has led to declines in the populations of the plants and the CTS. Within the past fifteen years, the cities in Sonoma County have implemented urban growth boundaries which serve to contain growth to specified areas; therefore, open space between the urban areas will be maintained. Some of the areas within these urban growth boundaries, however, include lands inhabited by CTS and the listed plant species. Agricultural practices have also disturbed seasonal wetlands and CTS aestivation habitat on the Plain. Some agricultural practices, such as vineyards, have also disturbed seasonal wetlands and CTS aestivation habitat on the Plain, while others, such as irrigated or grazed pasture, have preserved habitat with relatively little or no adverse impact.

1.2 Background

The Endangered Species Act (ESA) was enacted by Congress in 1973 to provide a means whereby the ecosystems upon which endangered and threatened species depend may be conserved and provide programs for the conservation of those species, thus preventing extinction of native plants and animals. The U.S. Fish and Wildlife Service (FWS) is the principal Federal agency responsible for conserving, protecting and enhancing fish, wildlife, and plants, and their habitats. The agency enforces federal wildlife laws, and administers the ESA.

In 1970 the State of California enacted the California Endangered Species Act (CESA). The California Department of Fish and Game (DFG) is charged with enforcing the provisions of the Act, which are found in Section 2050 et. seq. of the Fish and Game Code

The filling of wetlands is regulated under the federal Clean Water Act (CWA), (Sections 404 and

401) and the state Porter-Cologne Water Quality Control Act (Porter-Cologne Act). Additionally local land use agencies approving development projects are required to evaluate the potentially significant impacts and identify mitigation measures under the California Environmental Quality Act (CEQA).

On July 22, 2002, the US Fish and Wildlife Service listed the Sonoma County distinct population of the California tiger salamander as endangered on an emergency basis under the ESA. The final rule was adopted on March 19, 2003. FWS listed the species as threatened throughout the range on August 4, 2004 which includes the former Sonoma County distinct population segment. The CTS is not listed under the CESA at this time; they are a state species of special concern. Burke's goldfields, Sonoma sunshine, and Sebastopol meadowfoam were federally listed as endangered on December 2, 1991. The many flowered navarretia was listed on June 18, 1997. These plants are also listed as endangered by the state. Prior to the listing of the CTS, projects were required to mitigate for wetland and endangered plant impacts based on a programmatic biological opinion for the four endangered plant species on the Santa Rosa Plain (Appendix B).

Following the initial listing, FWS published a map delineating the potential range of the CTS in the Santa Rosa Plain. This potential range is shown on Figure 1. The range encompasses a significant area planned for development within the ultimate urban growth boundaries of the cities of Cotati, Rohnert Park, and Santa Rosa, and in areas of existing and planned rural development in the unincorporated areas of Sonoma County. The range also encompasses significant existing and potential agricultural areas in the unincorporated portion of Sonoma County.

The listing results in a requirement for any project within the CTS range to determine if it may have an impact on the CTS. Specific actions by FWS and DFG are necessary to allow take of the species, with mitigation required, or to determine that the project will not have an effect on the species. This often necessitates two years of field surveys to determine if the species is present on a project site and if the site contains breeding pools. These survey requirements, and lack of clarity on how to mitigate for impacts to CTS habitat, created a complex regulatory environment which has seriously constrained planned development.

1.3 Origin of the Conservation Strategy

The listing of CTS has caused a level of uncertainty to land owners and developers about how the listing would affect their activities. Private and local public interests met with FWS to discuss possible cooperative approaches to protecting the species, while allowing planned land uses to occur within the range of the CTS.

The result of these discussions was the formation of the Santa Rosa Plain Conservation Strategy Team (Team). It was agreed that the Team bring together representatives of the appropriate government agencies and interested parties to attempt to develop a conservation strategy for the Santa Rosa Plain that conserves and enhances the habitat for the CTS and the listed plants, while considering the need for development pursuant to the general plans of the local jurisdictions.

1.4 Purpose of the Conservation Strategy

The purpose of the Conservation Strategy is to produce a strategy for habitat conservation and enhancement of listed species on the Santa Rosa Plain. The Conservation Strategy will be a coordinated mechanism for processing permits for projects that are in the potential range of listed species on the Santa Rosa Plain. The Conservation Strategy establishes the mitigation that will be required in areas of potential impact, and designates conservation areas where mitigation should occur.

SECTION 2 – CONSERVATION STRATEGY TEAM

2.1 Conservation Strategy Team Goals

The goals the Team developed for its efforts are as follows:

- Develop a habitat conservation strategy for California tiger salamander and listed plant species
- Identify proposed areas for conservation
- Develop an implementation framework for the conservation strategy which identifies short- and long-term actions and milestones as needed
- Establish development process predictability

2.2 Role of the Conservation Strategy Team

The role of the Team is to develop a conservation strategy that considers and coordinates input from a variety of interests, which are sometimes common and sometimes competing, but will result in conservation of habitat and ultimately be a component of the recovery of the CTS and listed plant species. The Team has no independent authority; rather, authority lies with each regulating agency. In accomplishing the goals of the Conservation Strategy Team, all federal, state, regional, and local permitting processes need to be followed, and be consistent with the Conservation Strategy.

There are various regulatory and legal requirements for which individual agencies are responsible in the Santa Rosa Plain. As stated previously, FWS is responsible for administration of the ESA and DFG is responsible for administration of the CESA. The US Army Corps of Engineers (USACE) and the US Environmental Protection Agency (USEPA) have regulatory responsibility for administrating the Clean Water Act. The North Coast Regional Water Quality Control Board (NCRWQCB) has the responsibility regarding the Clean Water Act 401 Water Quality Certification as a State agency, and the state Porter-Cologne Act. The various local jurisdictions are responsible for compliance with the California Environmental Quality Act (CEQA).

SECTION 3 – CONSERVATION STRATEGY SUMMARY

The Conservation Strategy developed by the Team consists of a geographic framework and an implementation framework. The geographic framework describes nine conservation areas, and discusses how properties included in conservation areas may be affected. It also identifies areas of potential impact and areas not likely to impact CTS and listed plant species. The implementation framework describes how conservation preserves would be selected, mitigation measures necessary to achieve the strategy, and a variety of related mitigation issues. The implementation framework also addresses the application of mitigation banks, the development of management plans for preserves, adaptive management, and ongoing monitoring needs.

The success of the Conservation Strategy depends on the ability to fund the purchase and on-going management of mitigation properties. The Conservation Strategy provides a brief description of potential funding sources. Public participation and scientific peer review are necessary components of the process, and these processes are described. To assist readers of the Conservation Strategy, a glossary of terms and a list of acronyms are included. Finally, appendices are provided as additional resource information in support of the Conservation Strategy.

SECTION 4 – GEOGRAPHIC FRAMEWORK

4.1 Conservation Strategy Overview

Over the years, data on CTS breeding sites, migration corridors, and aestivation areas and the locations of federally listed plants within the Santa Rosa Plain have been collected by many individuals and organizations, including records from the California Natural Diversity Data Base. These data have been compiled into a GIS system for the Santa Rosa Plain in a cooperative effort by the FWS and DFG, resulting in a powerful mapping capability. This capability was then used by the Conservation Strategy Team to show existing known CTS and plant localities, land uses, jurisdictional boundaries, urban growth areas, and other geographic features. The strategy's geographic framework includes nine conservation areas distributed throughout the Santa Rosa Plain, and establishes preservation objectives for each conservation area.

The components of the conservation strategy are described in detail in the sections that follow. The conservation areas are shown on Figure 2.

4.2 Conservation Areas

The purpose of the conservation areas is to insure that preservation occurs throughout the distribution of the species. Using the GIS system described above, nine conservation areas ranging from northwest Santa Rosa to south of Cotati have been identified, and are shown on Figure 2. The designation of conservation areas is generally based upon the following factors: 1) known distribution of CTS, 2) the presence of suitable CTS habitat, 3) presence of large blocks of natural or restorable land, 4) adjacency to existing preserves, and 5) known location of

the listed plants. For example, the Llano and Stony Point conservation areas have some of the most important remaining large contiguous blocks of CTS habitat and the majority of documented breeding occurrences. Areas which are in the Laguna de Santa Rosa floodplain, are above 300 feet and characterized by oak woodland, or are adjacent to or surrounded by significant urban areas generally have been excluded from the boundaries of the conservation areas.

Preservation objectives have been established for each of the conservation areas. The preserve objectives recommend that 350-900 acres of actual preserve land ultimately be established within each conservation area, except the Southwest Santa Rosa Conservation Area. The range in acreage reflects the fact that the various conservation areas greatly differ in size and CTS distribution. For example, the Alton Lane Conservation Area identifies only 688 acres available for preservation, while the Llano Conservation area has 1,748 acres available. These preserve objectives represent a fraction of the overall conservation areas, and it is likely that the ultimate preserves will not be contiguous blocks of habitat. A basic assumption of the strategy is that the preserves would be located in areas of rural residential and agricultural land use similar to what currently exists, and that the current land use designations in the Sonoma County General Plan would not change substantially over time. If land uses were to change, the function of the preserves could be compromised. Table 1 shows the acreage goal for preservation in each conservation area.

Conservation areas are integral to the conservation of the species by directing preservation efforts into the most important areas, as well as to ensure well distributed populations. The Preserve Selection Criteria described in Section 5 explains the process to be used in selecting preserve sites as well as the minimum acreages needed to be preserved in each of the nine conservation areas.

The conservation area boundaries identify areas where mitigation for project related impacts to the listed species and vernal pools should be directed. It is also a focus of the strategy that emphasis be placed on mitigating the effects of near-term development in Southwest Santa Rosa in close proximity to where the impacts occur. The programmatic biological opinion for the listed plant species and the Santa Rosa Vernal Pool Ecosystem Preservation Plan recognized that listed plant distribution is sporadic within the Plain. The listed plants occur in the identified conservation areas; however, the scope of the strategy for listed plants does not cover their distributional ranges north of the Alton Conservation Area.

4.2.1 Effects on Properties Included in Conservation Areas.

Designation of an individual property as property within a conservation area does not change that property's land use designation or zoning, or otherwise restrict use of that property. However, ESA compliance is still required. Generally, acquisition of property for preserves will be from willing landowners. However, the Conservation Strategy does not cause government agencies to relinquish their rights of eminent domain. Conversely, the wildlife agencies have not historically used eminent domain.

4.2.2 Conservation Area Descriptions

Alton

The Alton Conservation Area consists of 688 acres. The only preserved habitat in this conservation area are the Alton Lanemitigation site (41 acres) and the proposed Woodbridge mitigation site (13 acres). The Alton Lane mitigation site has CTS present; however, it has been speculated that the CTS were introduced to the site. The Conservation Area and adjacent Northwest Santa Rosa Specific Plan area includes populations of Burke's goldfields and Sonoma sunshine which are the primary focus of conservation efforts in this area. Therefore, the minimum preserve goal is smaller for this conservation area than the other conservation areas due to its primary focus on listed plants. The minimum preserve goal for this area is 350 acres.

Wright

The Wright Conservation Area consists of 678 acres of which 172 acres have been conserved, as part of the Wright Preservation Bank. The boundaries of this conservation area were derived from known CTS and plant occurrence data. The existing preservation bank which supports both CTS and the listed plants is the focal point of conservation. The minimum preserve goal for this area is 450 acres.

Kelly

The Kelly Conservation Area consists of 708 acres. No land is currently preserved as habitat for plants or CTS. However, the City of Santa Rosa owns land within this area which is currently farmed and irrigated with recycled water from the Subregional Wastewater Reclamation System, which provides some conservation value. CTS, Sebastopol meadowfoam, and Burkes goldfields have been found in this Area. This conservation area is constrained by the Laguna de Santa Rosa to the west. The minimum preserve goal for this area is 450 acres.

Llano

The Llano Conservation Area consists of 1748 acres, of which 179 acres are currently preserved for CTS and plants. Additional habitat is currently proposed for preservation in this area. There are Sonoma sunshine and Sebastopol meadowfoam populations and CTS breeding localities within this area. Historic records of Burke's goldfields also exist for this area. This is the largest of the conservation areas. In addition, there may be additional breeding sites based on observations of adult CTS. The minimum preserve goal for this area is 900 acres.

Southwest Santa Rosa

The Southwest Santa Rosa Conservation Area is an area of significant existing and planned development. This area supports numerous CTS breeding sites and plant populations, primarily Sebastopol meadowfoam. This conservation area has existing preserves which should be connected by wildlife corridors (see Figure 2). These corridors will serve to provide wildlife linkages, aestivation habitat, and buffers from adjacent development. It is anticipated that these

corridors will be an average width of 500 feet. Existing and designated preserve sites and connecting habitat total approximately 92 acres. The focus of conservation efforts in this area is to assure that existing and proposed preserve areas are buffered, connected, and maintained in a functional condition. The minimum preserve goal for this area is 230 acres.

Stony Point

The Stony Point Conservation Area consists of 1396 acres, of which 66 acres are currently protected in preserves. Additional acreage would be preserved with the approval of several proposed mitigation banks. There are Sonoma sunshine and Sebastopol meadowfoam populations and numerous CTS breeding localities in the eastern and central portion of the conservation area, where surveys have occurred. Based on land uses in the western portion of the conservation area, it is expected that more breeding localities would be found if additional surveys are conducted. The minimum preserve goal for this area is 900 acres.

Northwest Cotati

The Northwest Cotati Conservation Area consists of 900 acres, with no lands currently protected for CTS or listed plants. Based on review of aerial photographs, this area includes potential habitat for CTS and listed plants. There are no longer any viable breeding sites known to exist within this conservation area; however, there are records of breeding in roadside ditches. The previously documented breeding ponds were removed and mitigated during the development of a recent project. Additional surveys may result in the identification of breeding sites, or sites where additional breeding ponds could be created. Survey information for this area is limited but suggests that CTS may be abundant in suitable habitat. Only limited numbers of Sebastopol meadowfoam occurrences are known in the area. The minimum preserve goal for this area is 450 acres.

Southeast Cotati

The Southeast Cotati Conservation Area consists of 941 acres, with no areas currently protected for CTS or plants. There is an overall lack of survey information for plants and CTS within this area; however, several adult CTS findings have been reported. It is anticipated that with additional surveys, additional CTS may be found within this conservation area. No plant populations have been reported within this conservation area. The minimum preserve goal for this area is 450 acres.

Southwest Cotati

The Southwest Cotati Conservation Area consists of 1668 acres, with no areas currently protected for CTS or plants. There is a lack of survey information within this area and it is anticipated that with additional surveys new localities of CTS may be found. Several adult CTS findings have been reported, but no plant occurrences are known in this area. The minimum preserve goal for this area is 450 acres.

SECTION 5 – IMPLEMENTATION FRAMEWORK

Projects adversely affecting listed species are subject to several levels of review. The objective of the Conservation Strategy is to coordinate the project approval process to provide consistency, timeliness and certainty. Discretionary development projects permitted or undertaken by local and state government agencies must be reviewed under the CEQA. CEQA requires that all significant environmental impacts (including impacts to endangered species and wetlands) be mitigated to the extent feasible. If these projects would result in the fill of wetlands they must be authorized under federal Clean Water Act (sections 404 and 401) and state Porter-Cologne Act. In obtaining these permits appropriate mitigation must be provided to assure that there is no net loss of wetland function and/or acreage. These projects must also comply with the state and federal endangered species acts as appropriate.

FWS and DFG are the responsible agencies for the administration and management of endangered species acts (see Section 1.2). FWS will generally be approving projects in the Santa Rosa Plain through Section 7 of the ESA. Under Section 7 the FWS consults with a lead federal permitting agency on the affects of their permitting action on federally listed species. For projects on the Santa Rosa Plain, consultation is usually with the USACE for authorization for filling of wetlands. The FWS has 135 days to conclude a formal consultation assuming that adequate information is received. Within 30 days, FWS can inform the consulting agency if there is inadequate information and therefore the time period would not begin for consultation. Upon completion of formal consultation, FWS responds to the appropriate federal agency with a biological opinion that provides take authorization.

Preservation lands identified as mitigation for a specific project during formal consultation are included as part of the project description. However, often the FWS/DFG do not receive adequate biological information on the proposed mitigation sites, or the project is often not completely described which can create a delay. The Preserve Selection Criteria, discussed below, will assist applicants in identifying appropriate mitigation lands expediting the process.

FWS, in concert with DFG, intends to develop a programmatic biological opinion with adoption of the Conservation Strategy which includes CTS and listed plants. This new biological opinion will replace the biological opinion for listed plants issued on July 17, 1998. The new programmatic biological opinion will expedite the permitting process because it will standardize the requirements for addressing and mitigating impacts to endangered. The programmatic biological opinion will have a check list that will also aid applicants in providing the appropriate information for permit issuance.

Certain projects within the Santa Rosa Plain may only impact uplands. Where projects may impact CTS upland habitat and do not otherwise qualify for consultation pursuant to Section 7 of the ESA, the only mechanism to authorize take is through Section 10 of the ESA. This is commonly called a habitat conservation plan (HCP). These applicants would need to apply for an individual incidental take permit. FWS will consider and process incidental take permits consistent with the Conservation Strategy. However, as described in the Implementation Plan, (Section 5.3) an HCP could be developed for the entire Santa Rosa Plain.

Preserve lands will also be provided through the approval of mitigation banks, which are further described in Section 5.2.7.3. The Preserve Selection Criteria will provide guidance on appropriate locations for banks.

Appendix C provides schematics for the various regulatory processes that are required for projects affecting listed species.

5.1 Preserve Selection Criteria

The Santa Rosa Plain Conservation Strategy Preserve System (Preserve System) will provide suitable habitat for the CTS and federal and state listed plants. This section describes the process for evaluating, and approving individual properties or parcels for inclusion in the Preserve System.

The suitability criteria will be used by DFG and FWS in guiding both mitigation and mitigation bank development. These criteria are to aid and help expedite the selection of preserves. It is important to understand that there are numerous other components that are required to address mitigation requirements, such as management plans, long-term endowments, and other necessary requirements, all of which must be complete.

A critical component of the Preserve System is that 350-900 acres of actual preserve land ultimately will be established within each conservation area, except the Southwest Santa Rosa Conservation Area. The range in acreage reflects the fact that the various conservation areas greatly differ in size and CTS distribution. For example, the Alton Lane Conservation Area identifies only 688 acres available for preservation, while the Llano Conservation area has 1,748 acres available. This objective assumes that the preserves would be located in areas of rural residential and agricultural land use similar to what currently exists, and that the current land use designations in the Sonoma County General Plan would not change substantially over time. Table 1 shows the acreage goal for preservation in each conservation area.

TABLE 1

Conservation Areas	**Acreage of Habitat Minus Developed Land**	**Minimum Preserve Acreage Goal for CTS**	**Acreage of Existing Preserve Land**	**Minimum Acres to be Preserved**
Alton	688	350	56	294
Wright	678	450	210	240
Kelly	708	450	0	450
Llano	1748	900	294	606
SW Santa Rosa	235	230	103	127
Stony Point	1396	900	178	722
NW Cotati	900	450	0	450
SE Cotati	941	450	0	450
SW Cotati	1637	450	0	450
TOTALS	**8931**	**4630**	**841**	**3789**

The minimum area to be conserved within each conservation area is calculated using a 2200 foot buffer around known breeding pond clusters. The 2200 foot distance was based on a CTS study conducted at Jepson Prairie Preserve, Olcott Lake, Solano County which determined that this distance would encompass 95% of a CTS population (Trenham and Shaffer unpublished paper, 2003).

5.1.1 Suitability Criteria

Suitability Criteria assist in determining whether a particular property or parcel supports suitable habitat for CTS and/or federally listed plants and is otherwise suitable for inclusion in the preserve system.
Following is the list of Suitability Criteria. To be considered acceptable for inclusion into the preserve system, a proposed property or properties should meet all the following conditions.

(1) Be within the boundary of one of the Conservation Areas designated by the conservation strategy.

(2) a) Contain known, occupied CTS breeding, aestivation, or dispersal habitat and/or a known population or populations of federally listed plants; or represent potential CTS or plant habitat. With respect to potential CTS or plant habitat the site must exhibit, in the judgment of the FWS and DFG, reasonable potential for habitat restoration or enhancement.

OR

b) Be approved by the FWS and DFG and function as a buffer separating an existing or likely future preserve site from nearby incompatible land uses (e.g. areas without CTS habitat), be a corridor or link from one preserve site to another or one conservation area to another, or be open space that provides other specific and recognizable conservation value for listed species.

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

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

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

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

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

With respect to any particular criterion (or criteria), FWS and DFG may elect to waive the criterion. The proposed preserve site may be deemed suitable by providing specific unique conservation value not identified in the above list, and contribute to the recovery of one or more listed species. FWS and DFG must provide justification for the waiver and provide a copy to the administrative record.

Up to 20% of preserve acreage may occur outside the current conservation area boundaries based on the following requirements:

1. It meets the preserve selection criteria (except for condition 1)
2. It is within the range of the Sonoma County CTS
3. If a listed plant is impacted, mitigation will occur within its range
4. These additional lands would become a part of the conservation areas, and be monitored through the adaptive management process

Sites approved outside existing conservation areas must be either near a conservation area or of adequate size to be capable of maintaining a CTS population on its own or in conjunction with surrounding protected property (i.e., open space easements). This would be reviewed and tracked by the adaptive management team.

5.2 Mitigation

This section describes mitigation requirements on the Santa Rosa Plain and how proposed requirements address impacts to the affected species. If any land is to be developed in a conservation area, the impacts generally must be mitigated within that same conservation area. This is true for all of conservation areas except the Southwest Santa Rosa Conservation Area because of the large overlap with development within the urban boundary and the fragmentation of the CTS habitat.

5.2.1 Mitigation for Wetlands and Plants

Projects currently affecting wetlands and endangered plants on the Santa Rosa Plain are required to mitigate in the following ways:

a) Mitigation for Wetlands

Lost wetlands are replaced by project permitees by creating new seasonal wetlands or enhancing existing wetlands within the Santa Rosa Plain. When mitigation occurs prior to the loss of wetlands, generally the replacement ratio is 1:1. Where mitigation occurs concurrent with the

impact the ratio is increased to 1.5:1 as required in the programmatic biological opinion for the listed plants (see Appendix B).

b) Mitigation for Plants

Based on the programmatic biological opinion for the Santa Rosa Plain, projects filling potential endangered plant habitat must mitigate by preservation of an equal acreage of existing occupied habitat on a 1:1 ratio. For sites which have documented extant population(s) of an endangered plant, projects are required to preserve existing occupied habitat on a 2:1 basis. Mitigation under the programmatic biological opinion must occur within the same conservation unit in which the impacts occur; however, exceptions have been made to this requirement. The three plant units in the programmatic biological opinion, starting in the north, extend from the City of Windsor south to Airport Road. The Central Unit extends south from Airport Rd. to Hwy 12, and the southern unit extends south from Highway 12 to Highway 116 (see Figure 1 in Appendix A). Meeting the preservation requirement for plant mitigation becomes problematic due to the scarcity of potential mitigation sites for Sonoma sunshine and Burke's goldfields in the northern unit. Consequently mitigation in the Windsor area has occurred in the Central Unit.

5.2.2 Mitigation for CTS

Proposed projects within the potential CTS range will fall into one of three categories:

a) Projects in an area likely to impact CTS and therefore required to mitigate; or
b) Projects in an area where potential impacts to CTS can not be determined without further study; or
c) Projects in an area unlikely to impact CTS.

All properties within conservation areas are included in category a), above.

Because the goal of the conservation strategy is to attempt to preserve a large enough area of suitable habitat to ensure the conservation of the CTS, mitigation ratios were developed based upon the assumption that mitigation would be provided by development anticipated over the next 10 years within the spheres of influence of the cities of Santa Rosa, Rohnert Park, and Cotati, and by residential or commercial development within the unincorporated area of Sonoma County consistent with the County's adopted General Plan. Mitigation would not be required by local agencies for any project that requires only a "ministerial" permit (that is, a project that does not require "discretionary" approval by the relevant land use agency under the California Environmental Quality Act).

This mitigation approach can be implemented by the permitting and resource agencies through their independent jurisdictions as well as in recommendations as part of the CEQA process conducted by the local land use agencies when making discretionary project approvals.

The same mitigation and survey requirements apply to both private and public projects. Mitigation requirements for projects that are linear in nature (roads, pipelines, etc.) are described in Section 5.2.6.

5.2.2.1 Projects Likely to Impact CTS

Mitigation ratios for CTS are determined based on likely impact to the species and its habitat. Adult CTS have been observed up to 1.3 miles from breeding ponds (S. Sweet, University of California, Santa Barbara, 1998). Therefore, a 2:1 mitigation ratio will generally apply to projects within 1.3 miles of existing breeding sites or adult occurrences.

The ratio was developed based on calculations regarding the amount habitat needed to meet the required conservation goal and the known projected impacts based on development projected to occur within the Spheres of Influence of the cities of Santa Rosa, Rohnert Park, and Cotati and within the unincorporated area pursuant to the County's General Plan within CTS habitat during a projected 5 to 10 year period. This was derived and subsequently mapped through GIS by using existing land use plans, aerial photography, expert knowledge of the areas, and data on CTS and plant from the California Natural Diversity Data Base.

The cities of Santa Rosa, Rohnert Park and Cotati have voter-approved urban growth boundaries designed for city-centered growth and intended to preserve rural land uses outside of the urban growth boundaries. The mitigation ratios and known projected impacts are based on development within the urban growth boundaries. However, some development in county areas outside of the urban growth boundaries is likely to occur, and some of that development is likely to have impacts that would need to be mitigated. The County of Sonoma estimates that some acres of impact may occur within a projected 5- to 10-year period. The locations that these impacts may occur can not be identified at this time. Mitigation for these impacts would be the same as for impacts in the cities, i.e. 2:1 mitigation for any projects within 1.3 miles of an existing breeding pool where the property may provide suitable CTS habitat. This would generate twice that many acres of preserve land distributed throughout the three zones. Again, the mitigation requirements would only apply to discretionary projects under CEQA.

The mitigation requirement for projects on parcels with existing hardscape can be reduced by the amount of hardscape present assuming that the hardscape does not provide some recognizable benefit to the species. If such a function is provided and the habitat will be preserved, measures must be included in future development to address loss of this function, i.e., retention of a movement corridor.

It is important to note that the mitigation ratios and the conservation strategy are dependent on current information on both CTS distribution and development that is currently proposed. If the land use designation of areas within existing CTS habitat changes, or if new information is discovered regarding the current range of CTS, such changes may be addressed in the implementation review process discussed in Section 5.4.

5.2.2.2 Projects in Undetermined Impact Areas

There are areas within the historic range where CTS information is lacking and further study may be needed to determine the potential impacts of projects within these areas. These will be identified as undetermined impact areas. Currently, some areas have not been surveyed for CTS

so although these areas are beyond 1.3 miles from known breeding sites or adult occurrences there may be CTS present. For proposed projects in these areas, FWS will first conduct a preliminary evaluation to determine whether the proposed projects are or are not likely to affect CTS, then project proponents may choose to conduct surveys using FWS protocols, or mitigate at a 2:1 ratio as described above. If surveys are conducted, mitigation requirements would be based on the results of the surveys. If CTS are present, then 2:1 mitigation would be required. If CTS are not present, the project would be unlikely to impact CTS and no mitigation would be required. Appendix C shows the process for projects in undetermined impact areas.

As surveys are conducted, additional CTS breeding sites may be identified within the undetermined impact areas. Identification of additional breeding sites will not result in mitigation requirements on surrounding properties. The process outlined in Appendix C will continue to apply to surrounding properties.

Additional preserve land beyond that identified in the above projections is expected due to identification of additional CTS occurrences as surveys are conducted. Since mitigation requirements generally apply to projects within 1.3 miles of existing breeding sites, identification of additional breeding sites will impact the property where the survey was conducted and surrounding properties.

5.2.2.3 Projects Unlikely to Impact CTS

Impact to CTS is not likely on lands beyond 1.3 miles from breeding sites, or on lands that are surrounded by significant barriers or are otherwise unsuitable CTS habitat. Properties where any proposed projects are not likely to impact CTS will be shown on a map. Neither surveys nor mitigation would be required for projects on these properties.

No CTS mitigation or surveys will be required for projects outside of the potential CTS range.

FWS has issued letters to particular project proponents stating their determination that the projects are unlikely to affect CTS; therefore, no mitigation would be required. The terms in any letters issued by FWS prior to completion of the Conservation Strategy will apply to these projects.

Some types of projects, such as a porch addition or construction of a swimming pool, may be insignificant enough that they would be considered unlikely to impact CTS even though the project is located on a property shown in an Impact Area or Undetermined Impact Area. Additional project and property information would be needed to determine whether such small projects would be likely to impact CTS. Such determinations are beyond the scope of this Conservation Strategy. Other activities in an impact area that would not have significant impact include irrigation and farming activities, such as shallow discing (6 to 8 inches deep), manure spreading, seeding, and harvesting.

5.2.3 General Mitigation Requirements

Mitigation can be accomplished by acquiring, by fee title or easement, an appropriate preserve

site and undertaking any wetland restoration/creation that would be required. Any mitigation site will require an endowment for long-term management and monitoring. Additionally, mitigation can be achieved either through individual mitigation sites or through mitigation banks.

Minimum Requirements:

- Land which satisfies the preserve selection criteria, adequate in size and location to assure long term viability

- Fee title or conservation easement, the property is preserved for the benefit of the affected species, any retained activities (agricultural) must be compatible with this purpose.

- Wetland creation plan, if wetlands are filled, as determined by USACE and NCRWQCB

- Management and Monitoring Plan: specified management actions necessary to manage, enhance, and protect the resources protected and created on the site. Monitoring plan to determine the success of created wetland and the status of the protected resources and effectiveness of specified management actions.

- Endowment: Funding to assure long-term management and monitoring.

5.2.4 Mitigation Banks

A bank is a pre-approved site which preserves habitat for sensitive species and or creates appropriate habitat. The appropriate amount and type of credits may be purchased from an approved conservation/wetland bank(s). (See Section 7.3, "Mitigation Banking") The benefits of banks are that the individual requirements are in place in advance of the impact and the management and monitoring responsibilities of the individual seeking mitigation are assumed by the bank operator.

5.2.5 Management Plans

Management plans must be developed for each preserve site. The management plan would address appropriate grazing and/or mowing to manage thatch, control invasive plants, and provide for fire fuels management, fencing, monitoring, and other long-term management actions. The management plan also will identify the amounts and sources of funding needed to maintain the preserve. DFG and FWS have developed a template that outlines appropriate management activities that must occur to maintain and manage the preserve site (Appendix D).

5.2.6 Mitigation for Linear Projects

Linear projects are defined as construction of roads, pipelines, trails, fences, utility lines, pedestrian pathways, roadside ditches, other similar structures, or maintenance of these structures. These projects may have different impacts and minimization measures than a development proposal. Such projects may have permanent direct or indirect effects or may only

have temporary effects. For example, if a road crosses an important CTS conservation area it could have a major impact by isolating the aestivation habitat from occupied breeding sites. In this example, the direct impact for the road construction may be minimal; however the indirect impacts of the road would be large. Pipeline construction on the other hand may have temporary effects associated with construction but once work is complete the affected area can once again function as habitat.

Minimization measures would be employed in design and construction to reduce direct impacts to CTS, listed plants, and hydrology of the surrounding areas. Minimization measures may include construction during the dry season, adequate passageways/under-crossings for CTS based on a recent survey, lighting designed to minimize off-road ground illumination, retaining the hydrologic characteristics of the surrounding area and avoiding breeding habitat as defined in the Conservation Strategy.

Where mitigation is required for linear projects, the impact area consists of the land disturbed by the construction operation. This may be significantly wider than the area occupied by the structure after construction is complete.

5.2.6.1 Roads (including On-Road Pathways)

Existing and proposed roads are within conservation areas, potential development areas, undetermined impact areas, and in areas where any construction is unlikely to impact CTS. In this section, "road" means a new road or expansion of an existing road for any purpose (including construction of on-road pathways). Road projects that would not impact CTS (i.e., signage, signalization without widening, vertical and horizontal curve adjustments without widening or disturbance to the hydrology of the surrounding area) would not be required to mitigate.

Where mitigation is required, preference will be given to mitigation sites that are located near the impact area.

Different types of road projects have different mitigation ratios because of the varying degrees of effects to migrating or dispersing CTS and effects to listed plant species. The different ratios also encourage design practices that minimize impacts to the species. Although there are no known studies conducted to determine which curb designs pose a barrier CTS, it is believed that CTS cannot or will not climb over curbs. Assuming that a well-designed road or pathway provides excellent passageways/under-crossings, the effects are greatly reduced compared to a road with curbs and no passageways.

a) Roads in Conservation Areas

Roads within conservation areas or along conservation area boundaries are particularly important. If not well designed, roads in these locations could divide conservation areas and prevent CTS migration from breeding pools to aestivation areas. These roads should be designed to allow for CTS migration by omitting curbs across the entire road width, providing gaps in curbs, or by providing passage underneath the roadway. CTS passages underneath roadways should be based on current research results for effective passage design, and located where a recent survey shows that CTS have crossed the area in the past. Studies have shown that lighting can negatively impact CTS, so roads within conservation areas or along conservation area boundaries that include lighting systems should be designed to direct the lighting to the roadway with minimal illumination of the surrounding area. Well-designed roads (and well-designed projects that widen existing roads) are encouraged by providing a reduced CTS mitigation ratio of 1:1 for road projects that meet the following criteria:

- adjacent to a conservation area boundary or through one or more conservation areas,
- constructed with adequate passageways/under-crossings for CTS based on a recent survey,
- include lighting designed to minimize off-road ground illumination,
- retain hydrologic characteristics of the surrounding area
- avoid breeding habitat as defined in the conservation strategy.

For road projects that meet the above criteria and are within the historical or current range of the listed plants, then the mitigation ratio would be 1:1 or more depending on direct or indirect effects to the listed plants.

If a proposed road splits a conservation area, having the potential of effectively isolating a population or populations and reducing the ability for CTS migration or dispersal, then the road must be designed using the above criteria. Roads along a conservation area boundary that do not meet the above criteria would be required to mitigate at a 2:1 ratio as described below.

b) Roads in Potential Development Areas

Roads in potential development areas have similar impacts to development projects. Since these areas are not intended for long-term CTS habitat, special design features are not needed for roads in potential development areas. Road projects would be required to mitigate just for the impact on potential upland habitat and any effects to listed plant species. The mitigation ratio would be 2:1 or more depending on any direct or indirect effects to listed plants.

As an alternative to the 2:1 CTS mitigation ratio, projects constructing a road in a potential development area may propose to retrofit an existing road through a conservation area. The existing road would be retrofit to meet the criteria described in a) above. The area of the existing road that is retrofit could be used as up to half of the mitigation area required. For instance, if a new road in a potential development will be 44 feet wide and 1,000 feet long it would have an impact area of 44,000 square feet or about 1 acre. At a 2:1 mitigation ratio, 2 acres of mitigation would be required. An existing road through a conservation area, 22 feet wide and 2,000 feet long, could be retrofit per the above criteria to provide 1 acre of mitigation; in addition, 1 acre of mitigation lands would need to be provided.

3) Roads in Undetermined Impact Areas

If a road is proposed in an Undetermined Impact Area as shown on Figure X, project proponents may ask FWS to conduct a preliminary evaluation to determine whether the proposed project is likely to affect CTS. If FWS can not determine that the proposed project is not likely to affect CTS, then the project applicant may choose to conduct surveys using FWS protocols or mitigate as described above. Mitigation requirements would be based on the results of the surveys. The process for projects in undetermined impact areas is shown in Appendix C.

4) Roads Not Likely to Affect CTS

Roads in areas that have been determined to be already developed or isolated to an extent that projects are unlikely to affect CTS are not required to mitigate.

5.2.6.2 Pipelines/Utility Lines/Pedestrian Pathways/Trails/Fences/Ditches

These types of project have temporary, and sometimes minimal permanent, impacts to CTS and require mitigation different than road projects. The following mitigation requirements apply to projects proposed in conservation areas and in potential development areas; they encourage projects to be designed and implemented in ways that minimize impacts.

1) If the impacts

- are temporary (habitat would be restored within 1 year)
- do not impact breeding habitat or are beyond 500 feet from breeding habitat
- do not include lighting,
- retain the hydrologic characteristics of the surrounding area, and
- avoid any effects to listed plant species or their habitat

then the five avoidance and minimization measures listed above would be sufficient and no additional mitigation would be required.

2) If the impacts

- are temporary (habitat would be restored after 1 year but before 3 years)
- do not impact breeding habitat or are beyond 500 feet from breeding habitat, and
- do not include lighting

then the mitigation ratio would be 1:1 or more, depending on any direct or indirect effects to listed plant species.

3) If the impacts would affect habitat for 3 years or more, impact breeding habitat or are within 500 feet of breeding habitat, disturb the hydrologic characteristics of the surrounding area or include lighting that could adversely affect CTS, then applicants will follow the mitigation ratios as outlined above for road projects and the programmatic biological opinion for the listed plants.

If a project of this type (Pipelines/Utility Lines/Pedestrian Pathways/Trails/Fences/Ditches) is proposed in an Undetermined Impact Area, project proponents may ask FWS to conduct a preliminary evaluation to determine whether the proposed project is likely to affect CTS. If FWS can not determine that the proposed project is not likely to affect CTS, then the project applicant may choose to conduct surveys using FWS protocols or mitigate as described above. Mitigation requirements would be based on the results of the surveys. The process for projects in undetermined impact areas is shown in Appendix C.

5.2.6.3 Maintenance

Examples of maintenance of linear facilities include street patching, sealing, or overlaying, pipeline cleaning, excavation to repair underground lines, and removing deposited sediment from roadside ditches. Mitigation for impacts due to maintenance of linear facilities will follow the guidelines listed above. If mitigation is required it will only be necessary once for each segment of each facility. Maintenance impacts would be mitigated at the time of construction, or before maintenance is completed for existing infrastructure. Additional maintenance activities would not require further mitigation.

5.2.7 Other Mitigation Issues

5.2.7.1 Surveys

Currently projects within the range of the CTS are required to conduct two years of surveys pursuant to FWS survey protocols (see Appendix E) to demonstrate the status of the species. Currently, where a project proponent can demonstrate that CTS is not likely to be present, (no suitable habitat is present, site is small and isolated from other habitat), the requirement to survey may be waived at the discretion of FWS.

With implementation of the Conservation Strategy, projects with known impacts to CTS as described in the strategy will mitigate at 2:1 ratios and will not need to do protocol level surveys. Projects located within CTS undetermined impact areas are required to conduct a habitat assessment pursuant to FWS survey protocols. If aerial photographs, a wetlands delineation, or other information indicate that potential breeding habitat, as defined in the FWS survey protocol, is present on the site, two years of larval surveys will be conducted. Since plant surveys will be required due to the presence of wetlands CTS larval survey can be conducted concurrently. Based on the results of the survey, mitigation, if necessary, will be consistent with the requirements of the Conservation Strategy. Where a project proponent can demonstrate that CTS are not likely to be present, (no suitable habitat is present, site is small and isolated from other habitat), the requirement to survey may be waived at the discretion of FWS.

Currently, within the Santa Rosa Plain some areas have not been surveyed for CTS. Although these areas may be outside 1.3 miles from a known breeding site, they may have CTS present. In these cases, a project proponent can choose to survey or mitigate at 2:1. (See Implementation Framework) All surveys are the responsibility of the project proponent.

5.2.7.2 Translocation

Translocation as it applies to the sensitive species of the Santa Rosa Plain (CTS and annual plants—Burke's goldfields, Sebastopol meadowfoam, Sonoma sunshine, and many-flowered navarretia) involves the collection and relocation of animals (larvae or adults) or plant materials (seeds or seed bank) to suitable unoccupied habitat within the Santa Rosa Plain. However, it should be recognized that translocation of these species is still experimental and long term monitoring and adaptive management will be necessary to establish standardized techniques that have demonstrated the most reliable success. FWS and DFG may require translocation of both CTS and listed plants on a case by case basis as a take minimization and conservation measure.

There are recognized potential benefits of translocating CTS and listed plants in the Santa Rosa Plain. Translocation of larvae and adult CTS can provide for the reintroduction of the species into areas from which they have been extirpated if suitable habitat is present. It can also be a mechanism of minimizing project impacts by limiting direct take and loss of individuals. Based on limited genetic information from the plain it appears that translocation could be a way of conserving the genetic diversity of the Sonoma County populations of CTS and listed plants. To date, several translocations of CTS have occurred on the plain but have not been adequately monitored or documented to determine if they were successful. The translocations have been primarily for the purpose of salvaging individuals to minimize take.

Relocation of plants through the salvage of seed or seed bank from habitat that will be lost or seed collection from existing preserved population, to newly created or existing unoccupied areas of suitable habitat is a way of establishing new populations of the species. It can also be a mechanism for preserving the genetic diversity of the sensitive species on the Santa Rosa Plain. The success of this has been documented for plants at several sites on the Santa Rosa Plain, where appropriate restoration techniques have been employed.

It should be recognized that translocation of these species is still experimental and all of the benefits or consequences may not have been determined. Monitoring and/or research, particularly for CTS translocations, are needed to determine the effectiveness of relocations. The effect of translocation on genetic diversity, positive or negative, is unknown at this time.

5.2.7.2.1 Guidelines for Translocation

Translocation may be required for salvage or compensatory mitigation. Where translocation is used for salvage, monitoring will be the responsibility of the land management organization. Monitoring may or may not be conducted, at the discretion of the land management organization. Where translocation is used to establish new populations of the listed species for the purposes of mitigating project impacts, monitoring will be required. Resources must be available for an appropriate length of time to monitor and determine the success or failure of the relocation. Performance standards and success criteria also need to be established. In either case, the receptor site must be protected from future development via fee title, or conservation easements held by an appropriate land management organization.

Translocation should only occur where it will not result in possible adverse genetic effects to the

species being relocated. Consequently, translocation should only occur to sites which currently do not support the species. Translocation to occupied sites for the purpose of enhancing the distribution of the species should only be done with animals or plant materials from the site or sites from the immediate vicinity.

5.2.7.2.2 CTS Translocation

Translocation of CTS would be to the nearest preserve site available, as approved by FWS/DFG.

CTS will only be translocated to sites that contain potential breeding habitat (i.e., pools that contain standing water continuously for at least ten weeks, extending into April) that does not already support a CTS breeding population.

Where a CTS population is established through salvage or mitigation subsequent to the adoption of the Conservation Strategy, the presence of this population will not require a change in the mitigation obligations of surrounding property owners.

5.2.7.2.3 Plant Translocation

Currently, there is no genetic information available about the listed plants on the Santa Rosa Plain. Phenotypically, there are morphological differences in various portions of the range for the plants. This variation can generally be conserved by translocations to sites near the impact site.

Translocation of plants has been successful in some parts of the Santa Rosa Plain. Future success of translocations plants in the Santa Rosa Plain will depend on proper site selection, planning, management, and monitoring. Site preparation and conditions of the site are some of the primary factors affecting successful translocation. If a site is being restored or enhanced, it should mimic the natural topography, soil conditions, and hydrology. Long term monitoring is needed to track success and determine needed management actions if success is not achieved. If a project is approved for translocation of listed plants as a mitigation measure, there must be an adaptive management plan with long-term monitoring of the site. The programmatic biological opinion for listed plants (Appendix B) gives further guidance on this issue.

It may take over 10 years to determine the success of habitat creation or restoration involving the translocation of sensitive plants. In some years, due to climatic factors or vegetative competition, they may not germinate and survive to seed set; in other years they may be quite abundant. This is why long term monitoring (e.g. 10 years) is important.

Under the Conservation Strategy, translocation is considered a recovery and management action and would be undertaken by or at the direction of DFG and FWS. Projects resulting in the loss of CTS breeding habitat or pools with known populations of endangered plant species will be responsible for the salvage and relocation as directed by DFG and FWS. The project will not be responsible for tracking the success of the translocations. Success will be evaluated by DFG and FWS using management funds or research grants.

Because the listed species in the recovery plan are so imperiled, seed collection and banking is a high priority to guard against extinction or irreversible decline of the species. Seed collection and banking safeguards against loss or decline of the species due to catastrophic events, is an important measure until existing populations are adequately secured and managed, and until plants at additional sites are found, repatriated, or introduced. Seed banking also provides material that may be used in future enhancement, repatriation, or introduction of populations.

5.2.7.3 Mitigation Banking

On the Santa Rosa Plain, there are two types of mitigation banks, wetlands mitigation banks and preservation banks. Banks are expected to be an important method of satisfying mitigation requirements under the conservation strategy. Preservation banks are established to preserve existing occupied habitat of sensitive species to offset losses of habitat elsewhere. Each mitigation bank may be established for a specific purpose, depending on the resources present and/or proposed to be created on the bank site. On the Santa Rosa Plain, these would be for wetland creation and/or the protection of the four listed plants and the CTS, or some combination of these species. Banks are pre-approved sites which sell mitigation credits which can be used to satisfy the mitigation obligations of a development project. Approval of the mitigation bank is conducted by the interagency Mitigation Banking Review Team (MBRT), which includes the USACE, FWS, DFG, NCRWCQB, and USEPA (see Appendix F). In gaining approval of a preservation bank, the bank operator demonstrates that the bank supports the species for which credits will be granted and develops a management and monitoring plan to assure long term protection and maintenance of the site. In establishing a bank, a property owner or banker enters into a contractual agreement with the regulatory and resource agencies to provide for the development, preservation, and long term management of the bank site. In doing so, the banker is authorized to sell mitigation credits based on the resources the bank supports. The focus of the management plan is to assure the species and their habitat will be preserved and maintained on the site.

Wetland mitigation banks are sites on which wetland habitat is already present and additional wetland habitat is created, restored, and/or enhanced. Credits are based on the number of acres of wetlands created at the bank. Credits can be authorized for creation or restoration of new wetlands and enhancement of degraded wetlands if appropriate. The total acreage of wetlands, existing and created on a site, is limited to assure that an appropriate balance of wetlands to uplands is maintained for proper ecological function. On the Santa Rosa Plain, many vernal pool areas have been degraded by past land use, particularly cultivation of grain crops and orchards. Where enhancement is involved, only partial credit is granted so that the number of credits is less than the number of acres enhanced. The reason this is generally an acceptable practice in the Santa Rosa plain is that many of the wetlands have been impacted or altered by previous land use practices, which has changed their topographic complexity and hydrologic characteristics, and ability to function as habitat for sensitive plants and CTS. Restoration and enhancement focus on restoring the historic configuration and hydrologic function of the wetlands and their surrounding uplands. Wetland credits are sold on an acre-for-acre basis and are used to meet no-net-loss requirements under Sections 401 and 404 of the federal C W A and state Porter-Cologne Act.

Plant credits are granted based on the quality of the site determined by the Habitat Quality Evaluation, developed during the Santa Rosa Plain Vernal Pool Ecosystem Preservation Planning process. Since the plants in question are found in the wetlands, the number of credits is based on the amount and quality of wetlands present on the site. Consequently, plant preservation banks can be authorized to sell more credits than the actual amount of habitat the site supports based on the quality of the site in relation to the quality of sites being lost. Plant preservation banks can sell credits to compensate for the loss of occupied or potential habitat under the federal and state endangered species acts, CEQA, and Section 404 of the Clean Water Act.

CTS preservation banks are established to protect and manage known occupied habitat for the species. Credits authorized for sale are based on the number of acres of habitat present on the site. No distinction is made between aestivation and breeding habitat in the allocation of credits; although, the bank must have a breeding pool onsite or be within 2200 feet of a breeding pool or an already protected site with a breeding pool. In cases where breeding habitat is not present, a breeding pool can be created if deemed appropriate by the resource agencies. Credits can be sold to meet mitigation requirements under the Federal ESA.

In establishing a mitigation bank the following actions must be completed before the bank can be authorized:

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

2. A management plan must be prepared and approved by the authorizing agencies. The management plan describes the actions that will be taken to maintain and enhance the site for the benefit of the species and habitat for which the bank is created. In the case of wetlands banks, a wetland creation and restoration plan must be prepared and approved, and the wetlands must be created and demonstrated to function properly.

3. A monitoring and remediation plan must be prepared to document the success of creation/restoration efforts and the management actions in achieving the objectives of the bank.

4. An endowment must be established for long term management of the bank site.

This list of actions is general in nature, and more detailed information is shown in Appendix D.

Table 2 describes how credits at banks are allocated and sold. As noted above each mitigation bank is established for a specific purpose (e.g., CTS, plants, wetlands, or a combination thereof). Compensation for impacts at the project site will be determined as outlined Section 5 of the Conservation Strategy. The amount of compensation required for impacts at the project site are determined independently through the appropriate permitting process. All mitigation banks are granted a specific number of credits that may be sold. The number of credits allocated to a bank is generally related to the number of acres of habitat present on the bank site, with the exception of plants as described above. If a bank is authorized to sell a combination of creation and preservation credits, it may be authorized more credits than the total area of the bank, but it can

only sell in combination a total that corresponds to the total area of the bank.

This example is a combination bank which includes created wetlands, and plant and CTS preserved habitat. The bank site is 100 acres, all of which is considered CTS habitat, it also supports 5 acres of existing wetland which support populations of endangered plants, and 10 acres of wetlands have been created on the site. Based on the resources present it is allocated a total of 115 credits. Based on the size of the bank the total number of credits which can be sold is limited to 100 credits. This example assumes the mitigation bank calculates 1 acre = 1 credit.

Table 2

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Mitigation Bank	**Project Name/Number**	**Compensation For Project Site Impacts**	**Credits Purchased from Mitigation Bank**	**Mitigation Bank Balance**
Name of Bank Here Total Acreage of Bank equals 100 acres				100 CTS credits available 5 ac plant credits available 10 wetland credits available
	Project One	40 ac CTS 2 ac plants 2 ac wetlands	36 ac CTS 2 ac plants 2 ac wetlands	60 CTS credits 3 plant credits 8 wetland credits
	Project Two	1 ac plants 3 ac wetlands	1 ac plants 3 ac wetlands	56 CTS credits 2 plant credits 5 wetland credits
	Project Three	50 ac CTS 3 ac plants 5 ac wetlands	43 ac CTS 2 ac plants--- (1 ac plant credit must be purchased elsewhere.) 5 ac wetlands	6 CTS credits 0 plants credits 0 wetland credits
	Project Four	7 ac CTS 1 ac wetlands	6 ac CTS-- ac CTS must be purchased elsewhere 1 ac wetland credit must be purchased elsewhere	0 CTS credits 0 plants credits 0 wetland credits

Explanation of project 1 transaction**:** An applicant must secure 40 CTS, 2 wetlands, and 2 plant

acres of habitat for compensation of their project impacts. This hypothetical mitigation bank supports 100 acres of habitat for CTS, 5 acres of plants, and 10 acres of wetlands. Because this bank supports habitats for all of the species impacted, the applicant can do "one-stop-shopping". The applicant purchases 36 CTS, 2 plant, and 2 wetland credits. The wetland and plant habitats at the mitigation bank is also considered habitat for CTS. Therefore, purchasing 2 plant and 2 wetland credits also satisfies 4 acres of the required 40 CTS acres. In order to reach 40 CTS acres, the applicant purchases 36 CTS specific credits.

This can be accomplished at either an approved mitigation bank or another suitable site as determined by DFG and FWS.

5.2 Implementation Plan

This section describes the various actions that can be taken to implement the Conservation Strategy and to continue to address the conservation of the species. These individual actions could be supplemented or replaced by other actions, as appropriate, as implementation occurs. Each governmental agency operates within the laws, ordinances, and regulations established by the applicable governing bodies. There are a variety of tools within those regulations that can be applied to implementing the Conservation Strategy. Likewise, private individuals and organizations operate within the boundaries established by themselves or their decision-makers. Following is the proposed plan for implementing the Conservation Strategy. The success of the Conservation Strategy relies on the implementation of steps 1 and 2 of this plan. Continued coordination and communication among the federal, state, and local agencies is also necessary to successfully implement the strategy.

Step 1

Time frame: Upon completion of the final Conservation Strategy

Memorandum of Understanding – This document would be executed by each of the Conservation Strategy Team member entities to express support for the Conservation Strategy and indicate intent to implement the Conservation Strategy within existing discretionary project approval processes. This first step would provide some development process predictability, but each project with potential impacts to CTS or listed plants would still need to prepare a CEQA document to meet the requirements of CEQA, and to obtain individual approval from FWS, DFG, USACE, and NCRWQCB.

Step 2

Time frame: Within one year after completion of the final Conservation Strategy

US Army Corps of Engineers Section 404 Permit – The USACE would initiate formal consultation with the FWS for a programmatic biological opinion on all USACE permits in the Santa Rosa Plain. Once the USACE receives the programmatic biological opinion, processing time for individual applications will be drastically reduced from current processing time.

Programmatic Biological Opinion – This action would be taken by the FWS to authorize incidental take for listed species on the Santa Rosa Plain on a programmatic basis. The programmatic biological opinion would expedite the USACE and NCRWQCB wetlands permitting processes. It would also replace the existing programmatic biological opinion for the listed plant species.

Section 401 Water Quality Certification and/or Waste Discharge Requirements (Dredge/Fill Projects) – If the applicant complies with the Conservation Strategy, and there is no net loss of wetland acreage, the approval process will be streamlined by NCRWQCB pursuant to section 401 of the C W A, and the state Porter-Cologne Act.

California Endangered Species Act Permit – The California Department of Fish and Game would issue permits to allow incidental take as provided for in Fish and Game Code section 2081, or make a consistency determination with a federal Biological Opinion as provided in FGC 2080.1.

Step 3

Time frame: Approximately two years after completion of the Conservation Strategy

Local Ordinances – Ordinances would be adopted by the local governmental agencies that would implement the provisions of the Conservation Strategy. The local lead agencies under CEQA would prepare and certify EIRs disclosing the environmental effects of adopting local ordinances to implement the Conservation Strategy. The EIRs may be for the entire jurisdiction or for specific geographic areas.

Template HCP/EA – For projects that do not qualify for consultation pursuant to Section 7 of the ESA and which comply with the Conservation Strategy, FWS would develop a template habitat conservation plan / environmental assessment which applicants could use.

Low-effect HCP – Where appropriate, FWS would develop a low-effect habitat conservation plan.

Step 4

Time frame: Within 3 to 5 years after completion of the Conservation Strategy

Local jurisdictions would determine if a habitat conservation plan would be necessary or appropriate for the Santa Rosa Plain.

5.4 Implementation Review

Given the complexity of the ecological system the Conservation Strategy is addressing, and the limited available information, it is recognized by the Team that there is uncertainty associated with the recommendations of the Strategy. Implementation review is an approach to addressing this uncertainty (Cylinder, Bogdan, and Zippin, 2004). In addition, with most large scale

conservation planning efforts, land use may also change over time which can lead to the need for changes in conservation efforts. Implementation review will be used to assure a well distributed population of CTS and listed plants throughout the nine conservation areas. It is preferred that mitigation occur in conservation areas in close proximity to the area of impacts.

Effective implementation review requires a monitoring and assessment component which provides for the collection and integration of new information into the Conservation Strategy. To regularly review the implementation of the Conservation Strategy, an implementation review team will be established as part of the Conservation Strategy consisting of FWS, DFG, USACE, USEPA, NCRWQCB, and local agencies (Sonoma County, Santa Rosa, Rohnert Park, and Cotati). It will meet annually to review new information and progress in implementing the Strategy. The Implementation Review Team may be convened at other times by any team member. Based on that review, it will prepare a report describing the status of implementation and making recommendations as needed to the implementing agencies on actions necessary to assure that the objectives of the strategy are achieved. For example, recommendations could include changes in conservation area boundaries, and research needs. The report will also provide information and recommendations regarding distribution of preserves within the nine conservation areas. The report will be made available to the public.

The roles of the Implementation Review Team members will be as follows:

- FWS – Lead agency; convenes annual meetings
- DFG – Maintain preserve data and monitoring data
- Local Agencies – Maintain land use and general plan data

If preserve land distribution is not in accordance with the Conservation Strategy objective of distributing preservation throughout the nine conservation areas, the Implementation Review Team will recommend measures to correct any discrepancy in the distribution of preserve lands among the conservation areas. Any measures adopted by the implementing agencies shall become components of the conservation strategy.

5.5 Implementation Monitoring

As part of the Conservation Strategy, and to facilitate implementation review, a geographic based tracking system will be developed to monitor land use change, and incorporate new information and the results of management changes and progress toward achieving the conservation objectives within each conservation area. DFG will be the lead agency for maintaining the tracking system. DFG will request land use information from the local agencies which are responsible for the agency general plans and land use designations. Information from the tracking system will be shared with the Implementation Review Team.

Additional information needs may be identified as part of the ongoing implementation of the Conservation Strategy, which may require focused research. The DFG and FWS, working with other agencies and interested scientists, will develop study proposals and pursue funding for this research.

SECTION 6 – POTENTIAL FUNDING SOURCES

This section describes a variety of potential funding sources to assist in implementation of the Conservation Strategy. The most likely and certain source is through direct mitigation of projects that are proposed within the range of the CTS. This is discussed in more detail in the mitigation section above. There are, however, other potential sources of funding. Some of these are as follows:

6.1 Section 6 Recovery Land Acquisition grants

These are highly competitive, and usually grant proposals are for $500,000 or less. The ranking criteria are weighted toward benefits to multiple species with final or draft recovery plans, high species recovery priority number. The acquisition is to be of size to protect all habitat needed for recovery/species needs through it's entire life cycle (i.e. both breeding ponds and upland habitat for CTS), and have sizable cost share by non-federal contributors (need minimum 25% cost share, and more points are given for a higher cost share). DFG would have a say in whether Wildlife Conservation Board money is used for non-Federal contributors. The cycle is annual, and the pre-proposal call is expected to come out in the fall and due around December. If the pre-proposal ranks high enough (decided by FWS and DFG), the applicant is allowed to submit a full proposal. The full proposal needs to identify parcels for acquisition, and must have willing sellers. Full proposals are due in the Spring, and decisions will be made by FWS/DFG, then forwarded to the Washington DC office of the FWS, who makes the final desision. Awards are announced end of that fiscal year. Federal funds cannot be used for mitigation, but can be used on portions of parcels beyond that needed for mitigation (e.g., if 15 acres is needed for mitigation, but 20 acre parcel is what is for sale, federal money can be used to go toward the extra 5 acres of that parcel that is not for mitigation).

6.2 HCP Land Acquisition Grants

This is a more sizable source of funding, but not applicable at this time since no HCP is permitted. If and when an HCP is permitted, this is a potential source of funding.

6.3 Private Foundations

Funding may be available through private foundations, such as Packard Foundation, Hewlett Foundation, etc., for projects that achieve habitat conservation.

6.4 State Revolving Fund

This is a state loan program that provides low interest loans to public agencies for water related projects. The program is administered by the State Water Resources Control Board. A specific source of funding for repayment of the loan would be needed.

6.5 Sonoma County Agriculture and Open Space Protection District

The District has local funding for the preservation of agricultural lands and open space and has, in the past, participated in acquisitions that contribute to the Conservation Strategy. The District could also participate in future funding that would support implementation of the Conservation Strategy; however, District funds may not be used to mitigate for the impacts of development projects.

6.6 Direct Legislative and Congressional Appropriations

Funding could be made available through direct appropriations by the Legislature at the state level and/or the Congress at the federal level.

6.7 The Private Stewardship Program

The Private Stewardship program provides grants and other assistance on a competitive basis to individuals and groups engaged in local, private, and voluntary conservation efforts that benefit federally listed, proposed, or candidate species, or other at-risk species.

SECTION 7 – PUBLIC OUTREACH AND PEER REVIEW

7.1 Public Outreach

The Team recognized the need for public input in the process of developing the Conservation Strategy. Prior to developing the draft Conservation Strategy, the Team held a public meeting on May 24, 2004 to gain public input into the development of the Conservation Strategy. The team also determined that a second public meeting would be held when the draft Conservation Strategy was complete and before the Conservation Strategy was finalized. The meetings of the Team were not open to the public.

To further inform the public about the Team efforts, notes of each of the Team meetings were drafted and posted on the City of Santa Rosa Web site for public review. Other information such as questions and answers regarding the team process, peer reviewer selection criteria, and peer review questions were also posted on this web site for public review (http://ci.santa-rosa.ca.us/default.aspx?PageId=1111).

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7.2 Peer Review

While several of the members of the Conservation Strategy Team are biologists and/or have specific knowledge of the CTS and listed plants, the Team determined that it was important to have its work reviewed by independent scientists who were not involved in the development of the Conservation Strategy. The Team also determined that this independent review would utilize a blind peer review process; whereby, the individuals conducting the peer review would be known only to the Team members representing FWS, DFG, and the facilitator. The full Team developed a set of criteria to be utilized by the three individuals listed above in selecting the peer reviewers. The peer reviewers were selected from a list of potential peer reviewers submitted by individual members of the Team.

The peer reviewer selection criteria developed by the Team and used to select the peer reviewers are shown in Appendix G.

The Team also developed a set of scientific questions to guide the peer reviewers in their review of the Conservation Strategy. These are detailed in Appendix H.

SECTION 8 – GLOSSARY OF TERMS

Aestivation – Living underground

Breeding ponds – The ponds or wetlands, seasonal or perennial, where the CTS breed

Buffers – Lands that might not have high habitat values alone but act to buffer preserves from adverse effect of adjoining lands. They also may act as wildlife corridors and may be used for aestivation in some instances.

Conservation area – An area designated for conservation and or mitigation for CTS or listed plant species

Conservation Strategy – The strategy developed by the Santa Rosa Plain Conservation Strategy Team for the conservation of habitat for the CTS and listed plant species

Impact area – Areas where it has been determined that projects would impact CTS

Listed plants – The plants located in the Santa Rosa Plain listed under the Endangered Species Act, more specifically, the Sonoma sunshine (Blennosperma bakeri), Burke's goldfields (Lasthenia burkei), and Sebastopol meadowfoam (Limnanthes vinculans), and many flowered navarretia

Non-native predatory species – Species not native to the Santa Rosa Plain that may prey on the CTS

Migration – The movement of the CTS between aestivation and breeding

Plain – Santa Rosa Plain, located in central Sonoma County, bordered on the south and west by the Laguna de Santa Rosa, on the east by the foothills, and on the north by the Russian River

Preservation bank – Mitigation bank established to preserve and manage land for its value has habitat for listed species or unique habitat characteristics, (vernal pools). Credits can be established based on the amount of acreage of the site, acreage of unique habitat features or the quality of the habitat.

Preserve site – A site set aside for habitat conservation and/or preservation

Team – Santa Rosa Plain Conservation Strategy Team

Translocation – The artificial movement of CTS or listed plant species for relocation to another area

Undetermined impact area – Areas within the CTS range where it is not know if projects will impact CTS

Wetland creation – The manipulation of the physical, chemical, or biological characteristics present to develop a wetland on an upland or deepwater site, where a wetland did not previously exist. Establishment results in a gain in wetland acres.

Wetland enhancement – The manipulation of the physical, chemical, or biological characteristics of a wetland (undisturbed or degraded) site to heighten, intensify, or improve specific function(s) or to change the growth stage or composition of the vegetation present. Enhancement is undertaken for specified purposes such as water quality improvement, flood water retention, or wildlife habitat. Enhancement results in a change in wetland function(s) and can lead to a decline in other wetland functions, but does not result in a gain in wetland acres. This term includes activities commonly associated with enhancement, management, manipulation, and directed alteration.

Wetland restoration – The manipulation of the physical, chemical, or biological characteristics of a site with the goal of returning natural or historic functions to a former or degraded wetland. For the purpose of tracking net gains in wetland acres, restoration is divided into:

a) Re-establishment: The manipulation of the physical, chemical or biological characteristics of a site with the goal of returning natural or historic functions to a former wetland. Re-establishment results in rebuilding a former wetland and results in a gain in wetland acres.

b) Rehabilitation: The manipulation of the physical, chemical, or biological characteristics of a site with the goal of repairing natural or historic functions of a degraded wetland. Rehabilitation results in a gain in wetland function but does not result in a gain in wetland acres.

SECTION 9 – ACRONYMS & ABREV IATIONS

CEQA – California Environmental Quality Act

CESA – California Endangered Species Act

CTS – California tiger salamander (Ambystoma californiense)

EA – Environmental Assessment

ESA – Endangered Species Act

DFG – California Department of Fish and Game

FWS – U. S. Fish and Wildlife Service

HCP – Habitat Conservation Plan

MBRT – Mitigation Banking Review Team

NCRWQCB – North Coast Regional Water Quality Control Board

NEPA – National Environmental Policy Act

Team – Santa Rosa Plain Conservation Strategy Team

USACE – U. S. Army Corps of Engineers

USEPA – U. S. Environmental Protection Agency

APPENDIX L
PEER REVIEW COMMENTS

Peer Reviewer #1

23 November 2004

Santa Rosa Plain Conservation Strategy Team
c/o Brauner Consultation and Mediation
P.O. Box 4857
Santa Rosa, CA 95402

Dear Conservation Strategy Team:

Thank you for allowing me the opportunity to review and comment on the Conservation Strategy for the Santa Rosa Plain. I am supportive of your work and recognized the substantial effort you put into creating this document.

Conserving CTS and the endangered plants in the Santa Rosa Plain will be a challenge, however, I do think it is an achievable goal. Most of my comments reflect my focus on the tiger salamander rather than the endangered plants. I hope that others more knowledgeable than myself will make sure the plants get sufficient attention.

My first impression of the Conservation Strategy is that it does not attempt to achieve or even present an optimal approach for long-term preservation. In my opinion, an optimal approach would seek to assemble large contiguous blocks of habitat. I recognize that this approach would be challenging given the extremely subdivided land ownership, but it is not clear why an optimal approach was not presented as a model against which to compare the proposed strategy. The rationale for selecting this sub-optimal strategy over other possibilities should be better developed.

On a positive note, I find the acreage goals to be on the order of what is likely to represent a reasonable reserve. However, I found little to the strategy beyond setting acreage goals. In my opinion just setting aside acres, without habitat restoration/creation, will do little to recover or secure the long-term preservation of CTS in the Plain. From the data I have seen, at this point it is primarily a dearth of suitable breeding pools which limits the distribution and abundance of this species. Pool creation or enhancement is the only way to change this. More focus needs to be placed on establishing a large number of productive breeding ponds nested within (if not reserve land) reasonably compatible upland habitat uses. Also establishing a broadly distributed network of breeding pools between which occasional movement is possible should be a component of the strategy.

I encourage you to continue with this effort. Ultimately, this entire project should be viewed as an experiment; especially with the proposed sub-optimal strategy, there is no certainty. Hypotheses for reserve design and management should be supported by the best available data, but do not assume that our understanding is complete. Mistakes will be made, but though monitoring and adaptive management hopefully you can avoid making the same mistakes repeatedly. This will be an iterative process and hopefully as you learn, from managing adaptively, your ability to provide the habitats these species require will improve.

Please feel free to contact me if any of my comments are not completely clear, or I can otherwise be of further assistance with this process.

Sincerely, Peer Reviewer # 1

APPENDIX L
PEER REVIEW COMMENTS

Summary:

I have completed my review of the "Conservation Strategy for the Santa Rosa Plain". I applaud this effort to find a workable solution for the long-term conservation of the CTS in Sonoma County. This is an extremely complex problem, and any working solution will require a long-term vision and cooperation among diverse parties. The Conservation Strategy is a good start in that process. Enhanced certainty is ultimately the goal of this process for both economic development and resource conservation; trust is essential for success here.

In my review I have focused mostly on the science, although where regulatory and process questions arose I attempted to explain my concerns and views on the available options. Of course, as a scientist, I would prefer to see additional research to fill in gaps in understanding before moving ahead with a plan. However, I recognize that for both the cause of economic development and conservation of the CTS, there is not time for extensive research before you act. I do think that using the best information available and a true adaptive management approach (where management actions are implemented as experiments, with monitoring designed to critically evaluate the assumptions on which management is based) substantial progress can be made towards conserving the CTS and the endangered plants in the Santa Rosa Plain.

Before addressing the specific questions raised by the Team, I think it is important to lay out my main concerns with the Conservation Strategy in its current form:

1) <u>There is no discussion of an optimal strategy for CTS protection in the Santa Rosa Plain:</u> In my opinion a reserve design that would protect at least three 1000 plus acre blocks of upland habitat with multiple large (>0.25 acre) breeding pools on each reserve would be best suited to the long-term protection of CTS. This design would afford protection of sufficient wetland and upland resources to maintain populations against most foreseeable threats to their long-term persistence. It would also allow flexibility in adaptive management; for example, the benefits of burning upland sections of grassland or enlarging a breeding pool could be tested with few confounding uncontrollable factors.
2) <u>The strategy that is advocated is not well justified:</u> From my reading of the strategy the goal is merely protection of a certain number of acres of upland and wetland habitats with little consideration of the spatial arrangement of habitats. I recognize the need for flexibility in this highly subdivided landscape, but I think this requires a more detailed discussion of how you plan to achieve your goals with this suboptimal design. The ultimate goal is not clear beyond the vague goal of long-term preservation of CTS. How specifically are you proposing to reach this goal, and why are you focusing on this sub-optimal strategy?
3) <u>An alternative strategy for expansion of CTS:</u> If protection of large contiguous blocks of habitat is not possible – an alternative strategy might be to create an extensive diffuse network of protected sites **each containing at least one substantial CTS breeding pool**. At this point the main factor limiting the distribution and abundance of CTS in the plain appears to be the small number of

productive breeding habitats. A focus on creation of a diffuse network of smaller preserves emphasizing the protection and construction of productive breeding pools, would be based on the hypothesis that off-reserve lands can provide sufficient suitable upland habitat for movement and some level of survival. That hypothesis is supported by the LSA report included in the package provided, and also by David Cook's study at Southwest Community Park. It seems to me that if portions of the nearly 3800 acres slated for protection were distributed in 10-30 acre habitat blocks across the Plain, a network of more than 100 breeding pools with some adjacent protected uplands could be established. This approach would be more likely to increase the abundance of CTS and their overall distribution in the Plain than even my 'optimal' strategy. However, it would also be more likely to lead to periodic (likely temporary) disappearances of CTS from certain breeding pools due to somewhat reduced upland survival, but the management hypothesis would be that the more extensive network of pools would also enhance the potential for interpond dispersal and natural recolonization. This approach is no more experimental than the one suggested in the Conservation Strategy, but I think it is superior in that it would increase the distribution and abundance of CTS.

4) <u>The Strategy contains little explicit discussion of CTS habitat needs for long-term persistence:</u> For long-term persistence CTS require sufficient areas of both breeding and upland habitats. If you reduce the area of breeding habitat, fewer larvae will survive to metamorphosis, and the population will be less likely to persist. If you reduce the area suitable upland habitat available, CTS will be either a) forced to live at higher densities within the available habitats, intensifying intraspecific competition, and reducing growth and survival; or b) be increasingly likely to wander into suboptimal habitats where growth and survival will be reduced if not eliminated. I suggest that a revised Strategy should more explicitly consider the habitat needs for CTS and the other species. Historic wetlands destruction appears to have resulted in a major decline in the number of suitable breeding pools for CTS, thus a key goal should be increasing the distribution and abundance of highly productive CTS breeding pools.
5) <u>Possible conflict between protecting uplands for CTS and creating wetlands for mitigation</u>: This is an issue that needs to be dealt with early in this process or it will lead to real problems down the line. Although studies, such as the one by LSA, show that a variety of upland land-uses are used as "aestivation habitat" **wetlands do not represent suitable upland habitat**. This is presumably why CTS have yet to be found within the 100 yr flood plain of the Laguna de Santa Rosa, even though suitable pools are present. Although burrows may develop in wetlands during the dry summer months, they are absent or extremely rare during the wet season when CTS move across the surface in search of new burrows. In research at Jepson Prairie, CTS were roughly three times less dense south of Olcott Lake where the landscape is largely flooded in winter as compared with north of the lake which is dominated by slightly higher terrain. In the Conservation Strategy there is no discussion of what portion of reserve areas must be upland habitat suitable for CTS 'aestivation'. My concern stems from experience. I have seen wetland mitigation banks with wetted areas approaching

50%. I think there needs to be a more explicit discussion about how these two potentially conflicting conservation goals will be accommodated within the revised Conservation Strategy.

6) No apparent provision for regional monitoring and management: The Conservation Strategy appears to rely completely on local monitoring and management on a reserve by reserve basis. However, this is a regional plan requiring complex regional oversight, management, and vision. This will require substantial resources and the strategy should better explain how this oversight and large scale management will be achieved.

The following are my responses to the explicit questions posed in Appendix H. My restatement of the questions are in **bold text**, my responses are in normal text.

1. **Are the minimum preserve acreages adequate to support both CTS aestivation and breeding and plants?** Note: I found it very troubling that the "Hale Bank" and possibly other areas that provide little to no benefit for CTS or endangered plants were included in the calculation of "existing preserve acreage" – this does not inspire confidence in these estimated acreages.
    a. **Adequacy for CTS** - For CTS I would answer this with a qualified yes. A 350 acre preserve, while not excessive, if including sufficient breeding wetlands and uplands, would have a high probability of supporting a CTS population with long-term viability. However, this is assuming that these acres are in one contiguous block. In addition, as I mentioned in my introductory comments, I do not think wetland acreage should be included in the determination of preserve acreage for CTS, or wetland and upland preserve acreage goals should be considered separately. I'd recommend a maximum of 10% wetland acres with hydroperiods exceeding 1 month in the areas within 600 m of CTS breeding pools, and these areas should not count as CTS upland habitat. Less persistent wetlands are less of a concern because there is more time for burrow re-establishment.
    b. **Adequacy for plants** - For the plants, this really depends on achieving sufficient acreages of suitable wetlands; uplands are less of a concern. Based on my understanding of the biology of the endangered plants under consideration, this adequacy could not really be determined based simply on reserve acreage. However, I would suspect that either through wetlands protection or protection and creation, sufficient habitat to maintain populations of these species could be encompassed within a 350 acre area.
    c. Impact of fragmented reserves – I have major concerns about the potentially fragmented reserves that would be created based on the strategy as currently written. I understand the need for flexibility given the extreme degree of parcel subdivision. I think the strategy would have more credibility if the minimum acreages only applied for contiguous (or nearly contiguous) reserves and the upper acreages were required if no single minimum acreage reserve could be assembled. In fragmented reserves a large proportion of the population might reside in off-reserve

upland habitats, where a change in land use could dramatically reduce upland survival and compromise the reserve. Can some statement be made that "to the extent possible minimization of fragmentation within the reserve will be sought"?

d. Are lands selection criteria sufficient – The land selection criteria seem generally reasonable. I would oppose reducing the minimum acreages set for each conservation area. Habitat preservation outside the conservation areas should not be discouraged, but it should not be counted towards meeting minimum acreage requirements within conservation areas.

2. Would establishing smaller minimum preserve acreages constitute biologically acceptable alternatives? – In my opinion any approach taken short of establishing 350+ acre blocks of contiguous land must be considered highly experimental. That said, I don't think complete habitat protection is the only way that CTS might be maintained in the Plain. An experimental approach worth consideration would be to establish large productive breeding pools on smaller preserves nested in rural residential landscape where largescale development or wholesale agricultural intensification are likely. The CTS population at Southwest Community Park provides a relevant example. This large, once-productive breeding pool is situated within a region of degraded rural residential uplands, and until recently supported breeding populations in excess of one hundred adults. Populations could be promoted through habitat creation/enhancement at other sites outside the urban growth boundary. It would seem that this approach might allow greater flexibility, however, it would be highly experimental and require long-term monitoring to ensure its success.

a. By establishing small preserves and promoting CTS on them you would be increasing the potential that neighboring landowners might be responsible for take. Would this be a problem? If so, this is a problem for the proposed fragmented preserve design generally. Ultimately this all points towards the need for an HCP for the Plain.

3. Would allowing up to 20% of preserve lands to be established outside conservation areas be likely to result in excessive fragmentation? If so what additional measures could be incorporated to avoid this? – If these areas were allowed to count towards preservation goals within conservation areas, and the lands protected were not along a conservation area boundary, then yes it seems clear that this approach would increase fragmentation. I would only opt for this approach if lands outside linked to lands inside the boundary and contributed to establishing a 350+ acre contiguous block. It is not clear why this allowance is even suggested. The revised strategy should include a clear rationalization for how this allowance would increase the overall benefit to the listed species – otherwise I do not think this allowance should be included.

4. Please comment on the potential effectiveness of the preserve design proposed for the Southwest Santa Rosa Conservation Area. – I consider this proposed design to be experimental, requiring verification of its long-term

efficacy. I know this area is of interest because it contains several known breeding ponds and efforts have been made to set aside some lands here (on Fig. 2 I cannot see any connection between the FEMA site and the triangular parcel to the west – I would hope some connection would be maintained). The extreme fragmentation here makes me less than confident in the long-term potential for maintaining CTS here, but I do think it is an experiment worth attempting.

a. **What would be a biologically acceptable corridor length and width? –** The proposed 500 foot corridor width seems reasonable to me. Based on the distances we have documented CTS moving, I would try to keep corridors less than 0.6 miles (1 km) in length. Biologically, the longer and narrower the corridor, the smaller the probability that a CTS could make it from one end to the other successfully.
b. **What attributes should the corridor have? –** I would suggest that corridors should: be dominated by upland grassland habitat; have walled barriers along both sides to keep animals from straying; and I'd recommend that at least one CTS breeding pool be constructed near the midpoint of the corridor. A pond within the corridor would reduce the need for individuals to make the complete trip from one end to the other. Rather if even a few adults bred in this pool a larger number of metamorphs would be produced and would have a greater chance of making it to the other side. It might also attact animals into the corridor, thus increasing the likelihood that it would serve its role of connecting reserves at each end.
c. **What scientific information is available upon which to base corridor requirements? –** Studies of CTS movement among ponds and through the uplands; Ivette Loredo's 1996 study published in the Journal of Herpetology; and the various survey reports of consultants submitted to the USFWS. All of these indicate that CTS are present, primarily in grassland habitats, up to 1.2 km from known breeding ponds. Although eastern amphibians have been shown to favor forested habitats, this is not the case for the CTS. Due to a lack of information I think these corridors would have to be considered experiments until their effectiveness could be verified. I strongly suggest monitoring that would allow critical evaluation of the effectiveness of corridors (pitfall trapping or other census methods would likely be required).
d. **Are proposed migration corridors adequate for seed dispersal… How would narrowing corridors affect this? -** I cannot knowledgeably comment.

5. **Are measures set forth sufficient to provide for CTS movement among conservation areas? –** No, not as far as I could tell. It is not clear from the document that this is a goal outside of connecting the SW Santa Rosa area to the Llano area. An alternative to natural connectivity is long-term monitoring and relocation when an area loses its CTS population. In a revised strategy I would like to see some consideration of the maximum distance between CTS pools that

would need to be maintained to promote regional connectivity among pools and conservation areas.

6. **Is the SW Santa Rosa conservation area of sufficient size and configuration to provide for a viable preserve? –** Maybe. This remains to be seen for all areas described here. Only monitoring will show whether or not the areas are sufficient, and if they are not the Conservation Strategy suggests that intensive management will be used to make them work. With intensive management, I imagine CTS could be maintained in many areas; however, this may ultimately be more costly than securing intact blocks of sufficient habitat. In this area I would suspect that creating or enhancing one or more breeding pools would improve the long-term potential for CTS.

7. **Are the measures adequate to facilitate migration within the proposed corridors? -** The corridors proposed should be considered experimental (see my response to #4 above).

8. **Do migration patterns differ among populations? –** Yes, but not in any way that we can predict. I would suggest that at this point you have to assume that CTS movement is essentially random. This is what unpublished data on the distribution of captures around two ponds in Monterey County reflect. David Cook's study at Southwest Community Park shows that more adults arrive at the pond from directions with more remaining undeveloped upland habitat, but that is presumably because animals have lower mortality in those areas. The fact that CTS commonly get stranded on roads indicates that they are not effective at assessing risk and moving accordingly. To be safe at this point I would assume random movement, unless barriers are created to divert or funnel movement.

9. **Are preserve management actions sufficient? –** No. The proposed monitoring and management recommendations are extremely vague. Because there is so much uncertainty in the sufficiency of the reserve design proposed in the Strategy, it seems to me like a more detailed adaptive management scheme would need to be put in place. This might include focused studies to determine a better way to quantitatively monitor this species, the actual effects of proposed 'management' actions, and what upland habitat features benefit CTS (the LSA report suggests that burrow density is not limiting). What sorts of management will be implemented if larval densities in pools appear to be declining over time, especially if you have no confidence that these measured densities are indicative of population trends. What sorts of monitoring and research will be implemented to determine the effectiveness of habitat corridors and road undercrossings? I would suggest that a more integrative monitoring and adaptive management plan for the entire Plain is what is required.

10. **Are the suitability criteria set forth sufficient to identify lands that will contribute to the conservation objectives? -** The basic criteria (in conservation area, supporting occupied or potential habitat or buffering existing habitat, <15%

hardscape, not isolated, not in 100-yr floodplain, no harardous materials) all seem reasonable, but are they sufficient to identify lands of value for conservation? Why is there no guidance based on maximum distance to a known or potential breeding pool? What about the potential for isolation by intensive agriculture or simple distance? Could surveys be required to document the presence of the species? For isolated parcels I would also want some assurance that a substantial CTS breeding pool exists or could be established on the property – isolated upland habitats with no breeding pools would seem of minimal conservation value.

11. **Are the plant translocation criteria sufficient? –** Others are better qualified that me to comment on this. However, it does seem like there is a history of at least limited success.

12. **Are the CTS translocation criteria sufficient? –** The criteria presented seem appropriate but incomplete. At a minimum there also needs to be a substantial requirement for monitoring translocation success so that this process can be verified and refined. At this point, you do not know that every pool that holds water into April is in fact suitable for CTS. For example, CTS larvae will likely perish in pools with 1) an insufficient food base and 2) insufficient vegetation/ depth as refuge from predators such as great blue herons. Newly created and existing pools may lack both of these important attributes. There should also be a minimum area and depth for translocation pools. Although CTS breed in small pools, overall fewer larvae survive to metamorphosis in these habitats. My opinion is that CTS should not be translocated into pools smaller than 400 m^2; and pools constructed specifically for CTS should be larger. An optimal design would include shallow margins where warm water stimulates productivity and rooted vegetation is present for egg laying, and also deeper sections as refuges for predators. Work in Monterey County (Trenham et al. 2000) suggests that larvae should be stocked into pools at a density not greater than 1 per square meter. Stocking at higher densities will just result in higher cannibalization rates. The following paper also contains some good recommendations regarding amphibian translocation and recovery planning generally (Semlitsch R.D. 2002, Critical Elements for Biologically-Based Recovery Plans for Aquatic-Breeding Amphibians. Conservation Biology 16: 619-629).

13. **Was the methodology used to create Figure 2 appropriate? -** I could not find any information on the methods used to create this figure and so could not evaluate this. However, it would have been instructive to also see some representation of land uses in the Plain.

14. **Will the 9 conservation areas be sufficient to establish long-term preservation of the CTS?** – I think they could be sufficient. If a network of productive breeding pools can be preserved or created on protected lands, situated such that interpond dispersal continues, and with sufficient resources long-term lands management, the 9 conservation areas may be sufficient to preserve CTS.

However, I have to stress that the reliance of the Conservation Strategy on a non-contiguous reserve design should be considered experimental with long-term monitoring built in and contingency plans if it appears that this strategy is not working (I saw no such contingency plan). Also, the assumption that regional land uses will remain similar to what currently exists seems like a big assumption in such a rapidly developing region.

15. **Will the proposed Conservation Strategy yield viable conservation preserves on a time scale sufficient for CTS preservation? Are other mitigation strategies potentially more effective? –** Unfortunately, you cannot know until you try. Because CTS are relatively long-lived, it is unlikely that they will go completely extinct before the conservation strategy can be implemented, and due to the capacity of females of this species to produce large numbers of eggs, if new breeding pools could be established, populations could recover rapidly. The strategy that is emphasized here appears to concentrate primarily on protecting existing habitat (pools and uplands). I suggest that a strategy focused on pool creation would be better suited to the recovery of the CTS. From the data I have seen most of the remnant vernal pools support tiny breeding populations of CTS and should not be relied upon for the long-term conservation of this species. Because we have seen that CTS at various sites (LSA report, SW Community Park) survive in uplands under a variety of land uses, an emphasis on the creation of a well distributed network of productive CTS breeding pools with none isolated from the next by more than 1 km might be a more promising strategy. A focus on a well-distributed network of productive breeding pools, if successful, would also preserve the CTS within a functioning ecosystem rather than in zoo-like isolated reserves. Potentially the best strategy would be a hybrid of the two approaches - with a mixture of large and small blocks of habitat each supporting at least one substantial CTS breeding pool to maintain the potential for pond-to-pond dispersal (i.e., stepping stone reserves rather than continuous corridors). I think a further essential consideration is that, because so little CTS breeding habitat remains, the number of breeding pools needs to be increased, which will require that in some cases the destruction of upland habitats be mitigated for with created or restored breeding pools.

16. **Is the conversion of upland habitat to wetlands a concern?** - YES
    a. **If so, what considerations should be taken in designing such projects to assure that CTS are not adversely affected? –** We cannot assure that CTS will not be adversely affected. Is there any chance that you could consider all or part of the Plain an experimental population to allow greater flexibility in testing experimental strategies? On the wetland conversion issue, I think all available information suggests that wetland habitats should not be considered upland habitat for CTS. This is a complex issue, CTS require wetland habitats for breeding but live most of their lives in upland burrows away from water. Wetlands are flooded for a substantial part of the year and thus cannot continuously support the mammal burrows that CTS require. Because I know large acreages of

wetlands will ultimately be created in the Plain for mitigation purposes, I think the primary consideration should be for maintaining regional upland connectivity across the Plain. Wetlands creation should not block CTS dispersal, for example large wetland should not be created which would completely block movement between two CTS breeding pools.

APPENDIX L
PEER REVIEW COMMENTS

Peer Reviewer # 2

November 28, 2004

PEER REVIEW OF THE
SANTA ROSA PLAIN CONSERVATION STRATEGY

This review is structured in two parts. Part 1 gives my concerns and recommendations in an approximate order of what I deem most critical. Part 2 gives responses to each of the reviewer questions for which you requested a response.

Overall, I find the Strategy to be well-constructed. It is a serious effort to create a successful plan to mitigate further loss of the listed species, and even to enhance their population numbers and likelihood for long-term success. The Strategy is structured within the framework of existing law, by parties with a long history of administering these laws. Indeed, if implemented as it is currently written, I believe that the Strategy could be used to streamline permitting as well as to enhance conservation of the CTS and four listed plant species. Despite the value of the Strategy as currently written, however, I believe that several changes are necessary if the goals are to be met fully, in a manner that could ultimately result in a delisting of the species.

The Strategy's overall goal is not completely clear. In the Peer Review Draft, page 3, under 2.2, it states "The role of the Team is to develop a conservation strategy … [that] will result in conservation of habitat and ultimately be a component of the recovery of the CTS and listed plant species." According to this sentence, a full recovery plan will be developed later, and the Strategy will be a part of it. However, under 2.1 on the same page, one listed goal is "Develop a habitat conservation strategy for the California tiger salamander and listed plant species." This statement implies that the Strategy <u>is</u> a complete plan for recovery. My opinion is that the Strategy is not a full recovery plan, but, consistent with the first quote in this paragraph, leads in that direction. The Strategy should state explicitly whether or not it is deemed to be equivalent to a plan for full recovery or a part of such a plan. If it is intended as a full plan, then a number of changes such as I present below will be needed. If it is not intended as a full plan, than language pointing to a more complete plan should be included in the implementation section.

Some of my recommendations are based on "science," *per se*, including within "science" a handful of observations that field biologists have made that I consider to be valid even though they are based on personal observations only. Since the science is incomplete, yet actions must be taken, other recommendations are based on my knowledge of the species and ecosystems in question, including what I believe to be reasonable assumptions about the biology of the species and the ecosystems of which they are parts.

APPENDIX L
PEER REVIEW COMMENTS

PART 1. Issues and recommendations in an approximate priority order.

Summary: The Strategy has several shortcomings that must be corrected if it is to fully achieve the goal of Section 2.1: [to] "Develop a habitat conservation strategy for the California tiger salamander and listed plant species." Foremost among these is that the plan depends on reaction to proposed mitigation measures that come from multiple parties. It is reactive, not proactive. Second, the Strategy concluded that two land-use practices, irrigation and discing, are compatible with CTS conservation, apparently based on documentation from LSA submitted along with the Strategy. I believe that this documentation has been misinterpreted and that it is far to early to conclude that these practices are benign. Third, the Strategy is based on a flawed assumption that tiger salamanders move along predictable corridors that can always be identified with surveys, and, based on this assumption, the Strategy presents an inadequate means for mitigating the effects of roads on the CTS. Fourth, the boundaries of some of the proposed Conservation Areas do not include adjacent areas that may be critical for conservation of the species involved, and adjustments to these boundaries should be made. Each of these concerns is discussed below.

1.1. Concern 1. The Strategy is reactive, not proactive. It will achieve its objectives only if the large number of separate mitigations and other actions happen add up to a suitable final product, but there is no broad plan to assure that this will be the case. What is needed is active planning for conservation within each area, not just response to mitigation and conservation proposals. Although the Strategy refers to "adaptive management" and both Management Plan Template and FWS/COE policies refer to this, the term is applied only within specific projects, not to whole conservation areas. Broader planning is essential and will require additional staff.

> **Discussion.** The identification of Conservation Areas (C.A.'s in my text) is excellent, although I believe that their delineations should be re-examined (see below under Concern 4). Furthermore, the use of movement data for the CTS from Olcott lake by Trenham and Shaffer is a good aid in establishing acreage goals. The Strategy, however, does not have an adequate mechanism to assure that the acreages outlined for each C.A. have contiguity, hence will really function as habitat for CTS. The Strategy evaluates each mitigation proposal on its own merits, but does not contain a mechanism to direct the various mitigations, both spatially and in terms of their elements (new and existing pools, small vs. large pools, terrestrial habitat, etc.) into something that works in each C.A. The primary Strategy mechanism of responding to mitigation proposals as they come forth would not necessarily result in success in each of the C.A.'s.
>
> Before detailing recommendations to rectify this problem, I note that the Strategy does contain a provision for implementation review (Section 5.4). In this review, however, data presented will be summaries of actions that themselves are not explicitly coordinated in advance according to an ecological plan, but are responses to mitigation needs that come forth independently from a number of separate parties. Although I respect all of the members of the rather large, proposed

Mitigation Review Team, my experience with such bodies in other contexts is that there are unwieldy. I believe that a more explicit, ecologically based planning function is required. A Review Team might still be valuable as an oversight board for this team. It does not escape my notice that my recommendations in this section are essentially a restatement of Part B: Comprehensive Conservation Planning Process, presented by the FWS itself on pages 11-13 of the July 17, 1998 Programmatic Formal Consultation for U.S. Army Corps of Engineers 404 Permitted Projects that may affect Four Endangered Plant Species on the Santa Rosa Plain, California. The Strategy does not call for anything as comprehensive as this section of the July 17, 1998 memorandum, yet it purports to lead to effective conservation of the CTS in addition to the listed plant species, and the 1998 memorandum appeared to require comprehensive conservation planning for the plants alone.

To make the Strategy more proactive, I recommend the following:

1.1.1. The Strategy should mandate examination of all of the habitat in each C.A., and identify the specific needs for CTS and plants. Based on this analysis, site-specific targets for mitigation and acquisition should be set. Since the "willing seller" idea is central, alternative targets would need to be identified. The plans for the C.A.'s would not only identify parcels that would meet goals, but would scope out the ways in which the actual mitigation plans could enhance the C.A. as a whole. The plans would be presented to consultants and others involved in conservation and mitigation, and proposals would be ranked and approved based on how well they fit into the plan for each C.A.

For the native plants, there are a number ways in which C.A.-wide planning would be beneficial. Each mitigation could be planned to help create self-sustaining metapopulations of the plants, a metapopulation being a set of smaller populations that interact through time. The nature and distribution of upland habitat as a zone for seed dispersal on the feet of animals like the California hare and as habitat for pollinators of the vernal pool plants, would be more comprehensively planned. Planning could seek to maintain some natural vernal pool areas as comparators for change through time with modified areas, rather than allowing mitigation proposals to add wetlands to all natural complexes. Advance ecological planning could also evaluate the restoration potential of parcels that mitigation specialists might not consider, and then direct mitigations toward those areas. In addition, smaller parcels with significant features could be highlighted for mitigation or preservation with other funds, rounding out and connecting various projects. Such smaller parcels may be critical for success, yet will be less attractive to mitigation specialists. Programs of landowner cooperation can be undertaken, and these are unlikely to be targeted as forms of mitigation. Finally, inoculation of new mitigations would be best done with seed from other sites, natural or created,

within the same C.A., and a C.A.-wide plan would facilitate the communication needed for this to occur.

For the CTS, C.A.-wide planning is particularly critical since the species relies heavily on all resources of an area. It is known that the a given salamander doesn't always breed in the same pool, and the theory of metapopulation dynamics suggests that a complex of multiple pools will better sustain the species over extended periods of time than a single pool. For example, prey for CTS larvae may not develop in one pool in a given year, but be abundant in the same pool in a different year. Avian predators often focus on limited areas, and might affect a given pool differently in different years. Freedom of movement among the various breeding pools in a given C.A. is essential. For these reasons, coordination of the construction of new mitigation pools in relationship to existing pools and open terrestrial habitat is critical, and this can be planned only by considering all resources of a C.A.

There is also a relationship between plant and CTS mitigation that needs to be considered. The kinds of habitats the plants require, generally shallower pools and swales, are not the same as required for CTS breeding, and the construction of pools consumes upland habitat. It is possible as well that shallow pools could be "reproductive sinks" for the CTS, reducing reproduction in a given area. Were this the case, extensive shallow-pool-construction should not occur next to known or constructed large pools where CTS may breed. Furthermore, uplands of one proposed mitigation site may be essential for CTS associated with a nearby existing or constructed breeding pond, hence these uplands should have less wetland creation on them than on uplands more distant from CTS breeding areas.

Here is an example of this proactive approach: I know that CTS breed on the Haroutunian Open Space Parcel in the proposed Stony Point C.A. I am also aware that larvae have been found in roadside ditches in many places within this area, and I show on the following two pages just how extensive this breeding (or attempt at breeding) is. (There may be other non-ditch sites of which I am not aware. In addition, there is a parcel of land north of Todd Road and west of Bane Road on which native wetlands were recently destroyed, and this area could have been breeding habitat for the CTS.) It is very likely that the rural residential nature of this area allows for movement and reproduction of CTS in many parts of the whole C.A. at the present time. Proactively, the Strategy could direct the construction of spaced, new breeding sites, which could dramatically elevate the chances for long term CTS success across the whole C.A. These sites could be placed in a desirable way on parcels of as little as a few acres and still function to allow CTS to survive on many of the surrounding rural residential lands, a consideration that suggests revision of the Strategy's concept that each proposed mitigation should have the capacity to be self-sustaining. Reactively, no such plan would be likely to emerge, because each proponent would be developing site-specific mitigation

APPENDIX L
PEER REVIEW COMMENTS

The following page presents known locations
for CTS in and near the proposed Stony Point Conservation Area.
Red dots are CNDDB locations prior to 2002. Black dots designated "001, 002," etc. indicate egg locations from 2001 or 2002, and black dots designated "CTS1, CTS2," etc. are larval capture locations from 2002.
All black dot data were collected by Trish Tatarian, and data have been submitted to the CNDDB

APPENDIX L
PEER REVIEW COMMENTS

goals, not C.A.-wide goals, and small parcels would not be likely to be targeted by those developing mitigation proposals. The movement of CTS within an area with numerous roads is also essential for its survival, an issue that I will address separately in Part 3 below, and one that also requires a C.A.-wide plan.

In sum, the proactive approach would direct mitigation to specific areas as the pattern for a given C.A. emerges, and would specify the kinds of mitigation required (large pool, shallow pool and/or swale; upland habitat improvement, etc.), not just respond to the proposals that emerge. There would be an overall strategy for each C.A., shared with mitigation consultants, and these consultants would be charged with developing pieces of an overall plan.

1.1.2. The Strategy should assure that it unfolds equally in all C.A.'s. As is, the plan assumes that conservation actions would be dispersed in some equitable way across the C.A.'s. However, there is no assurance that this would occur, even though Mitigation Review is stated as addressing this concern. I believe that the Strategy should address this concern from the outset. One of the criteria in approving any mitigation should be that, over time, the collective actions bring restoration to each C.A. Therefore, banks, mitigations, purchases, easements, and other actions should unfold so as to assure the viability of each C.A.

As an example, suppose that a few very large pieces of land, perhaps along Llano Road in the Llano Crescent or Stony Point Road in the Southwest Cotati area were proposed as a mitigation bank. It is possible that these few large banks could absorb much of the developmental pressure for a number of years, removing the incentive to mitigate elsewhere. This should be countered by limiting the number of credits that one of these banks could sell until other banks or actions in other C.A.'s have been put in place and achieved some success.

1.1.3. The Strategy should place a hold on most development outside of the urban growth boundaries, and in all areas shown for C.A.'s that happen to fall within urban growth boundaries, until the minimum acreages for conservation within the affected C.A. have been achieved in conformance with a C.A.-wide plan as described in Section 1.1.1 above. It is clear that "chipping away" at the available acreages for conservation within a given C.A. by approving development projects within the C.A. on a piecemeal basis could severely compromise the Strategy, further endangering the species involved.

1.1.4. The Strategy should be enhanced by developing funds for management activities that go beyond the roles of approving mitigations, maintaining data on these mitigations, and meeting annually to review the data. All of the roles for implementation shown under Section 5.4

"Implementation Review" are necessary and valuable. The laws and policies that the agencies enforce are essential elements of a plan, and the guidelines and consultations that lead to these are likewise essential. The agencies involved have a long and successful history of administering the laws and policies involved. Collectively, however, these agency actions represent a reactive function. (I recognize that DFG and others have initiated valuable land purchases, but for most of these, management funds have been too limited.) I believe that without additional human resources, the Strategy will be limited to a reactive function, because staff are stretched rather thin and don't have time to do the sort of ecological planning that I described above in 1.1.1. In addition to ecological planning, solicitation of additional funds such as listed in Section 6 of the Strategy is a potentially powerful addition to the Strategy. Gaining access to these funds is a very time-consuming process that involves meetings with agencies that have funds, developing proposals, and managing proposals that are successful. The responsibilities for obtaining and administering these funds are not identified in the Strategy. To perform these enhanced functions of ecological planning and funding, I propose the following:

1.1.4.1. Have the FWS appoint a recovery team for the Strategy at an appropriate and early stage of implementation, or an equivalent body that can enhance the implementation of the Strategy. So that the process of the Strategy is not slowed down, the implementation stages of the Strategy would go forward as planned, but the recovery team would be charged with serving as a sounding board for FWS, CDF, and other agencies on ecological planning issues. It should be clear that the involvement of such a team must be a constructive implementation of the finally approved Strategy, and not a re-examination of all of the issues and wholesale revision of the Strategy.

The new recovery team (or its equivalent) and agencies that appoint and interact with it should be supported by at least two staff members: (1) a fully-qualified conservation biologist who would develop C.A.-specific proactive plans for the team and agency review, and then lay the groundwork for implementation, and (2) a funding specialist who would develop and administer proposals outside of the mitigation funding that come from the routes specified in the Strategy and other funding sources not listed. Each of these positions would also require a research assistant and secretarial support as well as funds for space and equipment. It may also be beneficial to have mitigation funds used for a unified monitoring and management function under the authority of the conservation biologist, rather than having each consultant develop a plan. The personnel for such activities could still be hired and paid for by consultants, but the work would be undertaken in a unified way. It would be valuable if one member of the recovery team could be

affiliated with The Nature Conservancy, since this group has decades of experience in handling multi-pronged conservation strategies.

We live in an era of limited governmental funding for resource agencies, hence paying for these staff members and providing some part-time funding for the recovery team within agency budgets is unlikely. The Strategy should therefore allocate a portion of the mitigation "management funds" to these additional activities that enhance the entire Strategy, rather than just taking care of individual projects. Outside grants, or perhaps shared funding from the cities and counties could also be used for this purpose. Indeed, since the cities and county benefit substantially from the Strategy, it would not be inappropriate for them to fund an endowment to initiate hiring these staff people, with the understanding that the endowment would grow from grant funds and mitigation funds. Finally, the conservation biologist position and its support should be funded in perpetuity, and the funding specialist position should be continued until each C.A. has reached the desired self-sufficiency or it is clear that the use of outside funds has substantially achieved its role in implementing the Strategy. I view the Preserve System as an entity, like a state or national park, that requires ongoing management specifically directed toward it. Putting such management responsibility in the hands of busy people with other responsibilities is not desirable.

Where to house the staff is an issue the Strategy Team could address. Clearly, DFG and FWS are the central agencies, but proximity to the Santa Rosa Plain would be valuable for these staff people. It appears to me that association with either the Sonoma County Agricultural and Open Space Protection District or the Laguna Foundation would be valuable, with lines of authority to DFG and FWS.

1.2. Concern 2. The Strategy inappropriately indicates that irrigation and discing are compatible with CTS. In addition, irrigation is clearly incompatible with the listed plants.

Discussion. In Section 5.2.2.3, the Strategy states that "other activities in an impact area that would not have significant impact [on CTS] include irrigation and farming activities, such as shallow discing (6 to 8 inches deep) ..." It is possible that the statement is based on the study of the Santa Rosa City Farms by LSA dated August 12, 2004, which was included in the review materials. This study did find usage of irrigated and disced areas by CTS, but, notably, substantial CTS use of 1 hectare plots sampled on the City Farms occurred on only 2 of 14 plots (one plot had a single CTS capture). The two plots that did contain CTS in good numbers (Kelly D and Kelly C) were adjacent to natural habitat with presumed or documented

breeding habitat. The major conclusion of the LSA study is that the irrigated and/or disced areas of the City Farms do not support CTS.

In addition, even the conclusions of LSA (Section 4.6.3 on pp. 22-23) point to unstudied and possibly adverse consequences of irrigation and discing. Specifically, LSA raises the question about whether or not added moisture might create disease problems for CTS, and points out that discing can directly kill CTS or possibly crush them inside burrows. Not mentioned by LSA is that any irrigation that permanently hydrates a pool will encourage the non-native predators like bullfrogs and crayfish, which LSA did find to be negatively associated with use of a pool for CTS breeding, and that extensive hydration can even give large predatory insects in pools the advantage of being large and active when the CTS larvae hatch. A possible additional effect of irrigation is that it could lead to extinction of Mediterranean-climate-adapted vernal pool crustaceans that provide prey for CTS larvae. One prey item in particular, the clam shrimp, could be affected in this way. Regarding discing, as LSA noted, this practice does not necessarily lead to the elimination of CTS nor reduce the density of pocket gopher burrows upon which the CTS depends. As LSA notes, however, discing can reduce the numbers of CTS, and in areas where other factors are also leading to population declines, this mortality could contribute to local extinction.

Beyond considerations of CTS, irrigation almost certainly leads to the elimination of the listed plant species because it encourages invasion of non-native wetland plants, or natives that are adapted to permanent moisture and persist in the summer-wet pools. This crowds out the natives. Permanent moisture could also disrupt the seed viability and germination of the natives.

The analysis of the above discussion leads me to three recommendations regarding the Strategy:

1.2.1. Remove reference in Section 5.2.2.3 to the acceptability of irrigation and discing in CTS areas. In mitigation and acquired lands and easements, the two practices should not be permitted. In dealing with landowners, the practices should be discouraged or minimized, recognizing however that owners may have needs that require some discing and irrigation. (It does appear to me that discing is often used as a means of weed control when mowing would be just as effective.)

1.2.2. Delete the Kelly Farm C.A. from the Strategy, unless restoration to Mediterranean-climate conditions will be undertaken. Along with this, expand the Wright C.A. to include any non-irrigated areas currently shown in the Kelly Farm C.A..

1.2.3. Add language to the Strategy that summer-long irrigation is incompatible with mitigation of other conservation lands where plant or CTS mitigation is the goal.

1.3. Concern 3. The Strategy mischaracterizes the use of upland habitats by the CTS, and, as a consequence, does not plan adequately for access to uplands by the species.

Discussion. Three aspects of the Strategy are relevant to this critique, one more serious than the other. The first, perhaps merely a semantic one, is that the use of uplands by the CTS is referred to in the Strategy as "aestivation," and this term is defined as "living underground." This definition and use of the term are incorrect: aestivation means going into a state of torpor during the summer to survive adverse hot and/or dry conditions. It may be done by a given species in any habitat, not just underground. There is no evidence that the CTS enters a state of torpor, and, more importantly, its use of the terrestrial habitat is not just for resting. Like other salamanders it relies on this habitat for many needs. As stated by Semlitsch (Semlitsch, R.D. 1998. "Biological delineation of terrestrial buffer zones for pond breeding salamanders." Conservation Biology 12: 1113-1119.): "Terrestrial habitat is a 'life zone,' a critical habitat vital for feeding, growth, maturation, and maintenance of the entire juvenile and adult population." This statement applies to CTS, hence language in the Strategy should remove the term aestivation and substitute phrases like "terrestrial existence" and "upland habitat use." In his Ph.D. thesis, Peter Trenham Jr. points out that CTS take 4-5 years to mature, and that they suffer something like 95% of mortality after metamorphosis. He points out that "regulation of these populations may be more dependent upon terrestrial survival than previously suspected." Although changing the word "aestivation" to something more appropriate doesn't materially affect any policy of the Strategy, it does highlight the large importance of uplands to the species as spaces for growth, maturation, and survival as opposed to just "resting."

A second and more important problem in the Strategy regarding use of the land by the CTS is that the document does not properly characterize or take account of the pattern with which the species moves on land. This mischaracterization is portrayed in Section 5.2.6. where it states "Minimization measures may include ... passageways/under-crossings for CTS based on a recent survey..." Additional language regarding movement that portrays a partially misleading picture is found in 5.2.6.1: "If not well-designed, roads in these locations could divide conservation areas and prevent CTS migration from breeding pools to aestivation areas." The Strategy proposes underpasses in areas where recent surveys have indicated that CTS cross roads. All of these statements are well-intentioned, and, indeed, there are some places were road-kill of CTS is concentrated. The conceptual model for these recommendations, however, is that CTS breed in certain ponds and then "migrate" on predictable routes to "aestivation" habitat.

The literature on CTS movement has focused mainly on determining how far the animals move from breeding pools into upland habitat. Very little has been published on the patterns with which the animals move. I pointed this out to Dr. H. Bradley Shaffer a year or so ago, asking him what his experience has been, since he and his students have performed years of work with the species. His answer was

that the animals move from pools "pretty randomly." Peter Trenham's Ph.D. thesis referred to above also suggests movement in less than regular ways in that some adults bred in different ponds from year to year. Finally, the wide distribution I showed above for CTS locations in the Stony Point C.A. suggests that the CTS move in many ways throughout the area. In sum, the thought that surveys can pinpoint exact locations where road underpasses are needed is not the best means for assuring contiguity among habitats. The better model of how CTS move out of pools is that they disperse in many directions. "Dispersal," meaning a radiation of animals outward from one area to another is the appropriate concept, not "migration." Seemingly regular "migration corridors" are probably the exception rather than the rule, and some of the identifiable "corridors" may be the result of restriction of terrestrial habitat in the areas surrounding breeding pools.

A third deficiency in the Strategy is that it describes how curbs along roads can prevent CTS from crossing the roads, but then goes on to recommend omitting curbs or putting gaps in curbs (in addition to creating underpasses) as possible mitigations for the "roads as barriers" phenomenon. The Strategy does not mention that road kill has a large adverse affect on CTS populations. The effect of curbs is not just preventing crossing of the roads, but in trapping the salamanders in the roads where they get killed by vehicles. In an area with increasing traffic such as the Santa Rosa Plain, the Strategy should focus on ways to eliminate road kill by preventing the salamanders from entering the roads in the first place.

To deal with this problem of developing habitat contiguity and at the same time preventing road kill, I recommend the following:

> **1.3.1. Rather than basing the locations of underpasses on surveys, attempt to maximize the ability of CTS to move freely through an entire road-dissected area.** This can be accomplished by constructing "reverse curbs" along all roads in C.A.'s. Instead of a curb that goes up from the road to surrounding land, construct curbs that go up from surrounding land to the road. This will keep the animals off of the roads. (If a curb is needed for drainage of water off the road, curbs can be constructed to fulfill both functions.) Then, as an additional measure, provide underpasses at multiple points along the road. The spacing of these underpasses can account for any known corridors, but where these don't exist, plans should examine the habitats on both sides of the road and locate underpasses wherever movement is likely to be needed. I would envision having an underpass on average about every 300 feet along roads. I agree with the language of the Strategy, that "CTS passages underneath roadways should be based on current research results for effective passage design..." Funding for most of these road modifications can come as a part of any new road project in the area. Many County roads now require bike paths, turn lanes, and other features subsumed into the overall cost of building roads. For an issue as critical as CTS conservation, it is not unreasonable to require these added measures.

Some parties may initially think that this proposal requires an excessive number of CTS crossings, but I submit that the cost of having consultants look for and identify specific migration corridors in a way that would be defensible under CEQA and the ESA would quickly exceed the cost of constructing multiple underpasses. Referring again to the map of CTS locations in the Stony Point CA, we know now of 18 roadside locations, and this number is undoubtedly fewer than actually exist. These were determined "the easy way," by looking into aquatic habitat for eggs or larvae. The task of finding definitive "road crossing" areas would require significantly more effort: many people over periods of many years searching roads on rainy nights, at a huge cost. Problems of even defining "migration corridors" would doubtless arise. If an investigator found one salamander on a road, would this mandate an undercrossing? If he or she found four salamanders over an area of 200 lineal feet, but not all together, would only one undercrossing do? Better to assume that CTS move in ways that aren't fully predictable and make all of the roads "CTS-permeable" when they are improved.

1.3.2. Seek governmental and other funds, enhanced by the fund-raising staff member recommended in section 1.1.4.1, to provide "reverse curbs" and underpasses where high-traffic roads already exist. Major, high-traffic roads, many of which have been recently reconstructed and therefore fall outside of the Strategy as now worded will either impede CTS movement, or, equally importantly, result in road kill numbers that significantly threaten populations. Such major roads exist in at least four of the C.A.'s (Stony Point, Northwest Cotati, Southwest Cotati and Southeast Cotati), and provision for crossings of major roads is essential if the contiguity of CTS habitat required for self-sustenance is to be achieved. Without such crossings, the C.A.'s will be too fragmented to function properly. (The Strategy already plans for allowing movement of CTS between the Llano Crescent and Southwest Santa Rosa C.A.'s, which is essential for the long-term success of the latter C.A.) The standards for these crossings can be the same as developed for the above section: reverse curbs with multiple undercrossings based on the latest information about which undercrossing designs work best.

The most critical need is in the Northwest Cotati CA. A major breeding area existed in a farm pond southeast of the Highway 116/Stony Point Road intersection until just before the emergency federal listing took hold. Loss of this site is significant, and the success of the C.A. may well depend on restoration of the site or an equivalent site nearby. For this site to function, free movement across both Stony Point Road to the west and Highway 116 to the north must be assured. In addition, movement back and forth across Stony Point Road north of Highway 116 will be required if lands to the west of Stony Point Road in this zone are included in the final plan. To the south, both Stony Point and Mecham Roads must be made permeable for success in the Southwest Cotati C.A., and Petaluma Hill Road must be modified if the

Southeast Cotati C.A. is to succeed. The same may be true of Railroad Avenue. In the Stony Point Road C.A. free movement of CTS across Stony Point Road is essential, and the same will be true for Todd Road if the final plan includes restored habitat north of Todd Road. (It may be sufficient to include this northern restored habitat only for endangered plants, obviating the need for undercrossings.) As the ecological planning for each C.A. unfolds, all necessary crossings should be identified, and the funding specialist should work aggressively to assure that adequate crossing measures are implemented.

1.3.2 Be vigilant regarding state and federal projects that may not come before the parties to the MOU, and assure that CTS-compatible road measures are included in these projects.

1.4. Concern 4. The Strategy excludes from Conservation Areas some adjoining lands that have or may have wetlands or other habitat features capable of supporting the species. Boundaries should be adjusted to include these areas.

Discussion. The major outlines of the C.A.'s are well thought out, but selected additions to them should be made. These are as follows:

1.4.1. The Alton Lane C.A. should be expanded north of Wood Road, where known wetlands exist, some of which have harbored one or more of the endangered plants. Additional review of aerial photographs will be needed to identify the appropriate lands, but my preliminary suggestion is to go as far north as Parnell road and a line from the end of Parnell Road to the Wood Road/Spurgeon Road intersection.

1.4.2 As discussed fully under Concern 2, Data from LSA show that City Farms do not support the CTS except in a limited way. For this reason, the Kelly Farm C.A. should be eliminated as an entity, but portions of it that do support the CTS, or may have this potential, should be included in an expanded Wright C.A. Within this expanded Wright C.A., the Strategy should specify that restoration of irrigated lands on the Kelly Farm to Mediterranean-climate adapted ecosystems could lead to conservation of the listed species, and that such lands could be appended to the newly-described Wright C.A. following such restoration.

1.4.3. As also discussed under Concern 2, and for the reasons given in the above paragraph, areas in the Llano Crescent C.A. where extensive irrigation is done on private lands in ways similar to the City Farms should be excluded; for example, lands east of Merced Avenue and south of Highway 12. Alternatively, these areas could be included if the plan indicates that they will count toward conservation only if they are restored to the natural Mediterranean-climate ecosystem that supports the CTS and listed plants.

1.4.4 In the Stony Point C.A., significant wetlands with natural topography that lay north of Todd Road and west of Bane Road were recently destroyed. I was not party to any discussions regarding these wetlands, but it seems reasonable to me that they should be restored unless the destruction was properly authorized by the USACE and other agencies. Surrounding these former wetlands are other rural residential areas that are not dissimilar from parcels south of Todd Road. If restoration of these wetlands has been mandated, they and their surroundings should be included within the Stony Point C.A. A tentative suggestion for this addition would be to include lands north of Todd Road between Stony Point Road and the Colgan Creek Channel on the west and Bane Road on the east extending north to the vicinity of Oasis Drive and West Robles Avenue.

1.4.5. Adjacent to the Northwest Cotati C.A., there are significant potential habitat areas in most of the lands north of Highway 116 south of Helman Lane, and west of Alder Avenue, which are designated as "development areas" in the Strategy. Although some of the lands in this "development area" adjacent to Derby Lane and Highway 116 are now industrialized, other lands south of Helman Lane and west of Alder Avenue (to and past Locust Avenue) are rural residential, with substantial open areas that may harbor natural pools. These lands lie generally between the current city limits of Cotati and Helman Lane. The C.S. should be amended to include these rural residential and open lands within it, not as part of the development area. This change in the boundary of the C.A. is especially critical since these open lands are close to known breeding habitat east of Alder Avenue that was recently destroyed, and these areas may harbor adults and maturing juveniles that were associated with the now-destroyed pools. Such individuals may be critical for maintaining CTS viability in this area.

1.4.6. The Southwest Cotati C.A. should be extended further south in the areas on both sides of Mecham Road. Recently, I received a call from a qualified zoologist who lives on Wambold Lane who found a crushed CTS adult on his property. I have not yet reported this finding to CNDDB, and the landowner did not save the remains of the animal. Nonetheless, I believe that this finding indicates that CTS ranges further south along Mecham Road than indicated in the C.A. (Wambold Lane is the furthest south of the small residential roads in this area.) It is appropriate to include in the C.A. the small lots along Wambold Lane, Everett Road, and Balma Lane in that CTS may occupy habitat in and around structures on these properties, and the Strategy does not mandate any change of use for the property owners that might adversely affect them. In order to include lands from or to which the above-mentioned salamander may have moved, the C.A. should be extended west of Mecham Road to the northern limits of the Sonoma County landfill site, and east of Mecham Road to a line approximately 1,000 feet south of Wambold Lane and parallel to it.

APPENDIX L
PEER REVIEW COMMENTS

PART 2. Responses to peer-reviewer questions included in the review materials.

Question 1: Are the minimum reserve acreages established by the strategy for the conservation areas (see Table 1) adequate to support both CTS aestivation and breeding within these areas over the long-term?

I believe that they are, however as noted in my Part 1, there needs to be specific advance planning of an ecological nature to assure a proper configuration of breeding pools in each C.A. I did not specify a number of breeding pools in Part 1, but believe that 7-10 pools per C.A. will be necessary, and movement among them by the CTS must be possible.

Are these preserve acreages adequate to also meet the needs of the federally listed plants?

I believe that they are, however as noted in my Part 1, there needs to be specific advance planning of an ecological nature to assure a proper distribution of plant-supporting pools in each C.A., as well as healthy adjoining uplands, and to assure that plant and CTS goals are not in conflict. As noted in Part 1, I believe that some natural pool systems should be largely free of creation and modification to serve as "natural controls" of the behavior of the entire system. The call for proper grazing and burning measures will go a long way toward meeting the plant needs. Without these provisions, no acreage alone would meet the goals.

Will fragmented preserve areas, resulting from economically driven selection of noncontiguous parcels within areas of rural residential and agricultural lands, be adequate for long term preservation of CTS?

No, they will not, and this is the central theme of my response in Part 1.1.

Are the criteria for selecting preserve sites within areas of rural residential and agricultural lands as described in the Administrative Draft sufficient to guide the assemblage of the preserve system?

The Suitability Criteria as given in the Draft Strategy under 5.1.1 are sufficient for implementation of the initial stages of the plan. As I note in Part 1.1 above, however, explicit planning for a given C.A. would further enhance preserve selection. Among other considerations, I personally favor using only disturbed but restorable lands for wetland creation, because this would extend the habitat for species far more than simply amplifying wetland acreages in areas already having natural wetlands. Amplification and minor restoration are appropriate in natural areas if done minimally.

I would add one consideration, also given above in at the end of my Part 1.1.1 where I use CTS mitigation on the Stony Point C.A. as an example. In this area and other sections of C.A.'s, the rural residential areas should be viewed as they now exist as essentially continuous CTS habitat. The multiple roadside breeding attempts are strong evidence for this conclusion. Given this, the first requirement for success is probably the creation and stocking via transplantation of at least five new CTS breeding ponds, and many parcels in this C.A. would be suitable for this activity.

Question 2: An economic analysis conducted in connection with the strategy provides estimates for the costs of meeting its preserve requirements which, based on proposed acreage requirements, are very considerable. Would establishing smaller minimum preserve acreages for the conservation areas, or a range of acreages within which specific minimums that would be determined through time (e.g. based on further study and Implementation Review), constitute biologically acceptable alternatives to the minimum acreages currently specified? The following alternative to Table 1 in the Conservation strategy is provided for consideration: (Table not recreated here.)

As noted in my Part 1.4, I believe that the Alton C.A. should be expanded somewhat. If this is undertaken, then additional plant, and possibly CTS habitat will result, which addition could offset reductions in other C.A.'s with no effect on the balance.

I also recommended combining Wright and Kelly, because I do not believe that irrigated lands should be counted in conservation plans. If there is sufficient contiguous land of a non-irrigated nature (or land now irrigated that can be restored to Mediterranean-climate conditions) I believe that a single preserve in the area with a minimum area of 450 acres would be sufficient. This might make acceptable the alternative plan of reducing the requirement of 240 additional acres in the Wright C.A. depending on the geometry and connectedness of the parcels.

Llano is one of the recommended C.A.'s most critical to the success of the whole conservation effort, and it's acreage requirement should be held at 900 acres initially. If, however, a broad band of habitat that creates complete freedom of movement for CTS were to develop, the use of a corridor connecting it to the Southwest Santa Rosa C.A. were demonstrated for CTS, and all of the necessary road underpasses were in place, I believe that the recovery team and conservation biologist I recommend combined with review by the Implementation Team could be asked to consider a reduction below 900 acres. Connectedness to Wright/Kelly under Highway 12 (clearly an expensive proposition) as well as contiguity with the Stony Point C.A. across the Colgan Creek Channel could also be weighed in approving such a reduction.

The Southwest Santa Rosa C.A. is already minimal in area, and should not be reduced.

The same arguments I gave for the Llano Crescent C.A. above apply to Stony Point. If a truly functional 630 acre preserve were to emerge then reduction from 900 acres could be considered by the recovery/implementation team. In addition, in this area, if development interests and/or the municipalities were to proactively assure contiguity of movement for CTS at multiple points across Stony Point Road, then this action could justify some reduction in the target acreage.

For NW, SE, and SW Cotati, the data on CTS movement from Trenham and Shaffer indicate that 450 acres is a minimum preserve size, and the target should not be changed.

Question 3: Would allowing up to 20% of the strategy's preserve lands to be established outside the conservation areas, under the conditions specified and assuming the preserve selection criteria are appropriately applied, be likely to result in excessive fragmentation of its overall preserve system? If so, what, if any, additional measures could be incorporated to prevent this?

This provision would be acceptable if developed via a comprehensive planning process that I have outlined in Part 1.1 above. Contiguity and function are central concerns. A fully functioning, more or less ovoid section of habitat that adjoins the suggested 20% "out-of-C.A." zone would be better than multiple "blobs" of habitat within a C.A. connected by corridors that may or may not function well.

Question 4. The conservation strategy requires CTS migration corridors averaging 500 feet in width with a 200-foot minimum. Specifically corridors are identified in the Southwest Santa Rosa Conservation area to connect existing preserves and potential preserves within the conservation area and to connect these preserves to the adjacent conservation areas. Given the size of the preserves, please comment on the potential effectiveness of such a preserve design in providing for a viable CTS population in the Southwest Santa Rosa Conservation Area.

The plan can potentially work, but only actual data on CTS and on small mammals, including the California hare as a seed disperser, will be able to confirm function. Any corridor should have a CTS barrier along it in all places where adjoining uses threaten the animals. One possible way to test the effectiveness would be to reserve a larger corridor, say 1000 feet across, but confine movement and occupation to the Strategy recommendation. If study

over the first 5-10 years of the plan show the smaller width to be adequate, then that could be set aside as the permanent corridor.

In Part 1 above, I present a different model from "corridor" for movement of CTS across roads, however the corridor concept is appropriate for other habitat connections among habitat areas. Although complete contiguity is the goal in each C.A., some corridors may be necessary. Data from monitoring above would be valuable in designing these corridors as well.

On the broader issue of corridors, (a) what generally would be a biologically acceptable corridors length and width, (b) what attributes should be corridor have, and (c) what, if any relevant scientific information upon which to base CTS corridor requirements is currently available?

I am not up to date on corridor literature, but point to my recommendation of hiring a full time conservation biologist to manage the plan as valuable in setting standards within each C.A. One task of this person and his or her research assistant would be to examine all alternatives. In Part 1 above, I present a different model from "corridor" for movement of CTS across roads, however the corridor concept is appropriate for other habitat connections among habitat areas. Although complete habitat contiguity is the goal in each C.A., some corridors may be necessary. Data from monitoring above would be valuable in designing these corridors as well.

Are the proposed migration corridors adequate for seed dispersal and genetic exchange between isolated populations of listed plant species: How would narrowing of the corridors affect this?

The key to plant species dispersal would be to encourage occupation of corridors by the California hare and other animals such as the raccoon. I have observed hares on many small, rural residential parcels of 10-20 acres that are semi-isolated from other lands. A segment of corridor 500 feet by 2000 feet (23 acres) provides this sort of area. Segments of a 200 foot wide corridor might be too small. In contrast with determining CTS use, however, use by these mammals is easy to determine, hence studies such as suggested above could answer the questions (artificially creating a prospective corridor within a larger protected zone as an interim measure). Additionally, creation of wetlands along the corridor, including some for CTS and others for plants, preferably in somewhat separate areas, could facilitate function.

Question 5: Are the measures set forth in the Administrative Draft sufficient to provide for CTS movement between conservation areas bisected by roads, streams, and flood control channels?

They are not, and, for roads, I have addressed this issue fully in Part 1.3 above. The same concepts I presented for roads can apply to drainage channels and streams should be considered: CTS "reverse curbs" to prevent CTS from entering the channels combined with multiple crossing areas over the channels. The designs of such crossings require further study, as does the degree to which the channels and streams actually are barriers.

Question 6: Is the Southwest Santa Rosa conservation area of sufficient size and configuration to provide a viable preserve area for CTS?

In isolation, I would not want to say that success is probable. The habitats in question are already fragmented. Success really depends on the effectiveness of corridors, as addressed above.

Question 7: Are the measures outlined in the Administrative Draft adequate to facilitate migration within the proposed corridors (i.e. raised curbs, road under-crossings, or other protective measures)?

I have addressed these issues above in response to these questions and in Part 1.3. In short, the Draft needs to be revised based on a better model of CTS movement as dispersal rather than migration.

Question 8: Do CTS migration patterns differ from population to population, and if so, what factors are though to influence these patterns, and why?

Marsh and Trenham (Marsh, D.M. and P.C. Trenham. 2001. "Metapopulation dynamics and amphibian conservation." Conservation Biology 15: 40-49) addressed this issue in part for amphibians in general stating: "pond occupancy may be more indicative of the spatial arrangement of terrestrial habitat than the arrangement of breeding ponds." In other words, each population will have a different pattern of habitat use, and the use of a pond may depend as much on the suitability of surrounding terrestrial habitat as on the nature of the pond itself. The paper clearly implies that each population has a different pattern of habitat use. Equally importantly, note my analysis in Part 1.3 above to the effect that CTS do not really "migrate" hence the whole idea of finding identifiable "migration patterns" is flawed. As an example, if a really good breeding pool were surrounded by uniformly good terrestrial habitat, we would not expect the salamanders to "migrate" to just one part of the terrestrial habitat, but to <u>disperse</u> into it and to move back into the pool from all directions. The animals probably move about from one part of the habitat to another as they mature and then survive as adults.

Question 9: Are the preserve management actions set forth in the Administrative Draft, including Appendix D, sufficient to adequately protect the preserve lands as habitat for CTS and listed plant species?

I believe that these management actions are generally adequate, but I recommend, as in Part 1.1 above, a coordinated management plan that uses a paid ecologist and assistant to develop coordination among the units. Specific to Appendix D, I favor a sampling plan for rare plants that can plot actual data over time. An estimate of cover and areal extent might be more reliable than a count of plants, since counts in dense patches are very hard to make. The ecologist should have data that provide quantitative tracking possibilities for the plants, as do estimates of larval numbers for CTS. The design and implementation of such plans would be the responsibility of this person.

Question 10: Are the suitability criteria set forth in the Administrative Draft sufficient to adequately identify lands that will contribute to the conservation objectives of the Conservation Strategy?

See my response to Question 1.

Question 11: Are the translocation criteria set forth in the Administrative Draft, including Appendix B, sufficient to support establishment of new populations of listed plant species?

I believe they are.

Question 12: Are the translocation criteria set forth in the Administrative Draft sufficient to support reintroducing CTS, minimizing project impacts, and conserving the genetic diversity of CTS on the Santa Rosa plain?

I am not a geneticist, and cannot comment on the issue of genetic diversity within the plan area, except to note that the most conservative assumption is that there is some diversity over the area covered by the plan, and therefore translocation should be limited to adjoining areas. The Strategy is not completely adequate in the section on CTS translocation in that it does not indicate what characteristics make a pool a good candidate for translocation. Primary among these is the availability of cover to protect larvae from avian predators. Second is the availability of food. Both of these characteristics generally require that a new pool "season" for a few years before receiving larvae.

APPENDIX L
PEER REVIEW COMMENTS

Question 13: Was the methodology used to create Figure 2 appropriate?

Yes, this methodology was appropriate, and the figure represents a good comprehension of the issues. However, for advance, ecological planning, as I propose in Part 1 above, each C.A. will need to be studied in much more detail, and the existing GIS data will go a long way toward doing this.

Question 14: Will the preserve areas within the collective nine conservation areas proposed in Sections 4 and 5 of the Strategy, to be secured during the expected 5-10 year period of the Strategy, be sufficient to establish long term preservation of the CTS and listed plants within the range?

Yes, provided the kinds of issues I have discussed above, such as providing habitat contiguity, providing an adequate number of CTS breeding pools, and avoiding conflict between CTS and rare plant measures, are undertaken in a comprehensive, proactive way. In addition, management in perpetuity is essential since these highly disturbed systems cannot just be let to "run on their own."

Question 15: Will the proposed Conservation Strategy yield viable conservation preserves on a time scale sufficient for CTS preservation? Are other mitigation strategies potentially more effective?

This is a very important question. Regarding time scale, the plan should work in general, but there are selected areas where more immediate action may be necessary. One of these is the Stony Point C.A. The breeding effort in roadside ditches could represent a large, successful population with as yet unknown successful breeding sites nearby. Most of these roadside breeding efforts are not successful because the habitat dries out too soon, however, and it is possible that some of the animals represent females that might have bred in natural habitat north of Todd Road prior to destruction of this habitat. If this is the case, there is an immediate need for new breeding habitat somewhere in the northern end of this C.A.

The situation is even more urgent in the Northwest Cotati C.A. There are undoubtedly maturing salamanders south of Highway 116, produced in the now-destroyed breeding pool, that will have no breeding habitat when they mature in 2-3 years. Likewise, there may be such individuals in the vicinity of Alder Avenue (see section 1.4.5 above). In this latter zone, there may be breeding habitat sufficient to accommodate these individuals, but if not, new habitat should be created very soon.

Question 16: To address impacts to wetlands on the Santa Rosa Plain, project proponents are required to create, restore or enhance wetland on at least a 1:1 basis. Wetland creation results in the conversion of uplands to wetlands. Some of this conversion is expected to occur in areas occupied by CTS. Is the conversion of upland habitat to wetlands a concern? If so, what considerations should be taken in designing such projects to assure that CTS are not adversely affected?

I have addressed this to some extent in Part 1. Clearly, removal of uplands is a concern because the CTS population in a given area may already be minimal. The best measure to avoid this impact is to keep uplands near known or created CTS breeding pools undisturbed within the immediate vicinity of the pool (up to about 300 feet) so that created pools do not draw breeding effort away from the successful pools into shallow reproductive "sinks." Beyond this, comprehensive C.A. wide planning will be necessary to answer the multiple questions presented by each site.

APPENDIX L
PEER REVIEW COMMENTS

Peer Reviewer # 3

Review of the Draft Santa Rosa Conservation Strategy
November 28, 2004

General Comments

Overall, I agree with the "Conservation Strategy" approach to endangered species and their critical habitat. Landscape-level considerations of distribution, fragmentation, connectivity, and habitat utilization are essential for locating preserves and prioritizing acquisition in a rapidly urbanizing region. It also specifies the rules for mitigation, translocation, management plans, implementation and funding. The document "Santa Rosa Conservation Strategy" (SRCS) contains these essential elements, along with the regulatory background and some discussion of agency responsibility with respect to major tasks (e.g. selection of properties, permitting, data maintenance, convening Implementation Review Team).

However, there are other essential elements that a Conservation Strategy must specify in order to be effective. This document lacks these elements:

1) Adaptive Management Framework

The Implementation Review Process is an incomplete and ultimately ineffective form of adaptive management because, as proposed, it does not go beyond land acquisition to include the equally important science-driven land management necessary to maintain the focus species and improve (or simply maintain) the quality of their habitats. To provide an effective conservation umbrella that integrates decision-making and makes sure that decisions are implemented and evaluated, an "adaptive management framework" must a) include user groups as part of an adaptive management working group b) integrate policy, management, and research, c) meet frequently enough to insure focused and ongoing management action, monitoring, evaluation, and funding, and d) have a technical advisory group that can design the monitoring and science necessary to achieve management goals. Specifically:

a) The document outlines a process of "Implementation Review" (IR, section 5.4) to insure that elements of the SRCS are carried out, along with a program of "Implementation Monitoring" (IRM, section 5.5). The members of the Implementation Review Team are derived only from the participating agencies and do not include representatives of "user groups" whose cooperation will be essential (especially when money and labor are needed or when the inevitable "need for changes in conservation efforts" (pg 27) arises). Such changes are often seen as a violation of the Conservation Strategy approach by user groups excluded by the process of IR. In the case of the SRCS, the user groups include development interests (landowners group, developers group), conservation interests (e.g. CNPS), and recreational interests (e.g. bicyclists).

Each should have one representative on an "Adaptive Management Working Group" (AMWG) that also includes agency and local government representatives. The AMWG can consider political, economic and biological factors in implementing the Conservation Strategy, and as such, act as a conduit for information as well as distributing the long-term costs of implementation.

b) Although the SRCS mentions the importance of research to fill gaps in our understanding of these species and their habitats (pgs 20, 21, 27), it is the job of an AMWG to set management goals and objectives and thus set the priorities for management-oriented research. In this way, research is not a haphazard collection of "studies" that reflect the desires of academics and a few agency personnel (the current situation). It is kept focused on the immediate needs of the preserve system though a series of "key management questions" that comes directly from the goals and objectives of the AMWG. And the monitoring needed to actually implement effective resource management (e.g. status and trend, cause and effect) can also be focused to support specific decisions that the AMWG will have to make. Otherwise, file cabinets will continue to fill with unused monitoring reports and data (the current situation).

c) Meeting annually will not be at all adequate for actually implementing the SRCS and actually doing the management needed to achieve an effective reserve system (see #2, below). This document ignores how difficult it is to coordinate overworked agencies, develop goals, objectives and key management questions, coordinate management and research, write useful reports, sustain long-term, science-driven management across the landscape of acquired properties, and obtain the necessary, long-term funding to sustain those efforts.

d) Ultimately, when the AMWG hammers out its goals, objectives, and key management questions while providing a forum for political, regulatory and economic concerns, it is up to a "Technical Advisory Group" (TAG) to design the tools, science and monitoring programs that affect management, fill data gaps and allow evaluation of all management actions. The TAG is a subset of the AMWG, insulated from politics as much as possible, that can provide the objectivity needed for supporting the AMWG's decision-making. An experienced consultant or resource management group (e.g. Circuit Riders) can be hired to lead the TAG.

2) Mechanism for Sustaining Management

Believe it or not, acquisition of properties to preserve habitat is the easy part of the conservation process. Management is much harder because of a) data gaps in how to manage to maintain the biological diversity that justified acquisition in the first place (hence the need for adaptive management to integrate research with monitoring and policy), b) the need to sustain management into the indefinite future with adequate funding and labor, and c) the lack of an institutional home to make sure actions are taken, relevant monitoring data are collected, summarized and given to the AMWG. Specifically,

a) The adaptive management framework described above is needed to fill data gaps that arise when the AMWG must make a decision. The SRCS acknowledges these limitations with respect to genetic information (pgs 20-21), translocation (21-22), mitigation efforts (23-24), including wetlands creation projects. The document must specify a mechanism for resolving these questions, and not simply leave it to the current array of agencies. The mechanism is the framework discussed above.

b) Filling data gaps needs to be systematically approached by the AMWG. This will often require science to develop prescriptions or tools, and that science takes time (5-10 years for some tools) and money (on the order of $10,000's to $100,000's for a single, focused research question). The time and money requirements often stall or sink conservation efforts, yet development and its impacts are not deterred. Meanwhile, doing nothing results in the loss or degradation of populations from preserved lands, as has been the case at the Todd Road Reserve.

c) The issue of "who actually does the management?" is not addressed in the SRCS. This is not trivial, in fact it is and has been a major impediment to better resource management on the Santa Rosa Plain for decades. Agencies such as DFG and FWS do not have the expertise or the labor to actually do reserve management. With one or two people in each agency, the efforts have been Herculean but unsustainable. These people should advise the AMWG and seek funding, but the properties need a "Reserve Manager", a labor source, and a system for tracking management actions and monitoring (as directed by the AMWG). User groups, if included in the adaptive management process, could be an important source of labor. However, the doing of the management may have to be turned over to an experienced land management organization (e.g. Sonoma Land Trust).

Also, I have to say that an agency such as DFG cannot "maintain preserve data and monitoring data" (pg 27). As an institution they simply cannot cope with information, especially in the absence of an adaptive management framework. You are simply piling more unfunded work on a handful of people whose principle job is enforcement. The AMWG structure must be in place to make sure things happen in a timely manner, to make sure that decision-based monitoring takes place, and that data and reports are properly archived.

3) Summary of Existing Management Research

Although the narrative for CTS (Appendix A) and the SRCS (pgs 10-14) contain a good number of relevant facts for determining suitable habitat, minimal areas, and corridor characteristics, there are no such facts presented for the listed plants. USFWS and DFG have been funding research to determine management regimes for its Santa Rosa properties for more than five years, including an Access database that summarizes the biological, logistical and security characteristics of each reserve (some of which form cores of the proposed conservation areas). Yet, none of this is cited in the SRCS. It may point to the problems agencies have in knowing what to do with the information they are given (2c, above), or they simply not be aware of the implications of the research they

have already paid for. In any case, the SRCS should at least elude to the existence of this research as a basis for implementing an adaptive management process.

Responses to Questions for Peer Reviewers

Questions 1 and 2.

Regarding minimal acreage for listed plants, one of the most important features is that preserves be large enough to contain entire, and not truncated, pool and swale systems. Swales are long, linear features that can bring (or once brought) floodwaters and propagules to pools. We have found that swales with altered hydrological characteristics (becoming too dry or too wet) significantly affect habitat quality for the listed plants. competitive, invasive grasses and perennials take over habitat and reduce its suitability for the listed plants. Also, swales that dry too quickly or fill too slowly (due to drainage alteration) lead to severe herbivory by non-native slugs. So, a property must be large enough to contain complete swale systems that will be unaffected by alterations on adjacent properties.

Also, smaller reserves invariably require greater management efforts, including time and money that are extended into the indefinite future. These costs can and will be substantially greater than the price per acre for acquisition. Effective management can overcome the effects of small size if it is sustained into the indefinite future and if the small property is spatially or hydrologically linked to a larger, adjacent property. Some small properties surrounded by development are simply too difficult to manage because grazing and fire are politically unfeasible.

From the standpoint of listed plants, the 174 acre Wright Preservation Bank is large enough to contain many, intact swales with a minimal amount of intensive management (if restoration is not the goal). Its populations (*Limnanthes vinculans, Pogogyne douglasii*) are apparently stable. Todd Road, at 77 acres, has been unmanaged with respect to listed plants for the 20+ years since cattle were removed. Unfortunately, its listed plant populations have been declining (e.g. *Limnanthes vinculans*) or apparently extirpated (*Lasthenia burkei*). The roughly 15 acres of intensively managed lands at the Sonoma County Airport provide an effective refuge for *Lasthenia burkei*. But in this case, regular mowing around the tarmacs with removal of cuttings retards competition from exotic annual grasses (in part by lowering available nitrogen). However, the 30 acres of unmanaged Haroutunian property does not contain many intact swales and is slowly losing its plant populations to slugs and competition from introduced plants (mostly *Lolium*). So, reserves on the order of $> 10^2$ acres may get by with minimal management (if they are not already too degraded), but those less than that degrade in the absence of focused, long-term management.

Q 4.

The listed plant species probably dispersed by flooding events, as swales overflowed their bankless edges. Corridors, in the usual sense of the word, and as mapped in Figure 2 of the SRCS, are irrelevant given the amount of drainage that has been installed across the plain. Within a large property (e.g. Wright), overflow may still occur in rare years and would be important. But unless these corridors were designed hydrologically and unless they connected vigorous populations, I doubt they would ever operate to affect genetic exchange.

Q 9.

As I said above, effective, long-term management is the key to making small reserves work in a fragmented landscape. Effective "management plans" (5.2.5) need to be coherent, landscape-wide, sensitive to property attributes, and science-driven. They need an adaptive management framework to be implemented and evaluated over time. I do not believe DFG and FWS will be able to do this.

Examining Appendix D, it is clear why adaptive management is needed. The "goal" is never to monitor (as stated in Elements 1-1, 1-2, 1-3). The goal is to affect some endpoint that is beneficial to the target species or ecosystem (actually an objective). Monitoring only tells you whether you've achieved the objective. And for the purpose of maintaining/enhancing habitat, status and trend monitoring is inappropriate. Instead, cause and effect monitoring is used to test a management-oriented hypothesis (e.g. "Ho: Grazing is not beneficial to subpopulation sizes of *Limnanthes vinculans* at Wright Preservation Bank"). The process of selecting the right management question to address, matching it to the right tool (e.g. mowing or grazing) and instituting the proper type of monitoring is the meat and potatoes of an adaptive management framework. The "template approach", consigned to overworked, underfunded agencies, has not and will not succeed in actually benefiting the species and ecosystems of concern.

Q 11.

As the SRCS says, translocation of listed plants is still experimental (pg 20), lacks clear success criteria (pg. 21), and evaluation using long-term monitoring data (pg. 21). It also tends to create populations and not communities. This is important because natural communities are being lost to development (not just populations), and because it is the community and ecosystem context that will ultimately determine whether translocated populations will persist. So, the SRCS should emphasize preservation of intact natural communities on large, contiguous parcels and not rely upon a still "unproven" fix. Salvage of the seed bank is important, but again, who is now doing collection and banking for purposes of restoration? It seems like it is only being done for mitigation purposes on a project by project basis, not as a hedge until "existing populations are adequately secured and managed, and until plants at additional sites are found, repatriated or introduced" (pg 22). This is a job for a reserve management institution, as discussed in the general comments above.

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Q 14.

I believe the distribution and proposed size of the reserves is adequate for long-term preservation, but only if long-term, science driven management takes place in the context of an adaptive management framework.

Q 16

High quality uplands should not be sacrificed to create seasonal wetlands (the latter with dubious conservation value at the gene and community levels). High quality means with populations of native perennial grasses and forbs, as well as a scattering of woody savanna species. These uplands should also be managed in concert with the natural wetlands so that total biological diversity remains high across the landscape. Otherwise, places like Alton Lane get the "Swiss cheese" treatment, with the density of natural and created pools far exceeding anywhere else on the Plain.

APPENDIX L
PEER REVIEW COMMENTS

Peer Reviewer # 4

Comments/answers to "original" questions. The "new" question addressed at the end.

SANTA ROSA PLAIN CONSERVATION STRATEGY TEAM
QUESTIONS FOR PEER REVIEWERS

The Santa Rosa Plain Conservation Strategy Team has prepared a Draft Conservation Strategy for the Sonoma County population of the California tiger salamander (CTS) and the listed plant species (Sonoma sunshine, Burke's goldfields, and Sebastopol meadowfoam) located in the Santa Rosa Plain. The Team determined that it would be appropriate to have this strategy reviewed by qualified professionals (peer reviewers). The Team would like the peer reviewers to answer the following questions when evaluating the Draft Conservation Strategy. The Team also asks that the peer reviewers to provide whatever data they have which supports their assumptions, opinions, or conclusions.

1. Is the minimum preserve size as developed by the Strategy Team adequate for both aestivation and breeding? Is the preserve size adequate to also meet the needs of the listed plant species? Ok, a pet peeve, I always refer to the non-breeding habitat as upland habitat (which also not 100% correct) – CTS do a hell of a lot of living away from the breeding sites – including occasionally going dormant – aestivation habitat sounds like CTS migrate there, go dormant for years, then wake-up and migrate.

   As for minimum preserve size – obviously there is no definitive answer. We've all seen CTS persist (at least on the order of a decade or two) in areas surprisingly fragmented and limited in extent, and CTS have disappeared from many fairly large and apparently unfragmented areas – so determining how much is necessary is as much art as science, and, therefore, erring on the conservative side (bigger reserves) is necessary.

   The extent required to support a population of CTS over the long-term is clearly dependent on a whole host of factors, with a main one being habitat quality (= level of fragmentation, condition of the vernal pools and uplands, hydrologic and geomorphic stability/succession, presence of other species [both native and non-native], level of on-going human impacts, etc…..). Another factor contributing to the size necessary to support a CTS population over the long-term is the level of management.

   So at one end of the spectrum of how big is necessary is an unfragmented, unmanaged, and largely intact system, that is low on non-native species and on-going human impacts. Such a "pristine natural reserve" likely needs to be moderately large in order support CTS for 10s or 100s of years. Depending on

how the specific site responds to variation in weather, 100s of acres + are likely necessary. If there is considerable variation in location and longevity of the seasonal pools, then more pools, more upland habitat will be necessary in order to provide a safety net of heterogeneous conditions (= 1000s of acres). If the seasonal pools are relatively stable (= predictable in location and fill characteristics), then only a few hundred acres (or fewer) may be necessary to support a CTS population over many 100s of years.

At the other end of the spectrum are sites that require significant on-going management. I'm sure that you could design a 1-acre or less CTS reserve that could persist for many years (think of the prairie dog town exhibits that were standard parts of many zoos – and expand slightly, and add in a seasonally filled, artificial pond – and you've got a CTS reserve/exhibit). Such reserve would take daily maintenance in order to keep the few components in check, but you could conceivably keep one of these going indefinitely. Not a great conservation success story, but…..

Back to the question of specific acreages of the proposed conservation reserves – it is hard to evaluate the situation. If you were able to set aside the target acreages in such a way as to have a single, or a few, large, unfragmented block of habitat in each of the broad conservation areas, then the acreages listed should be more than enough (particularly with some perpetual funds to conduct management). However, a piecemeal arrangement of 10 acres here, 50 acres there, possibly with some sort of a corridor linking them, is worrisome (to say the least). A reserve system of 450, or 700, or 150 acres may or may not be worth anything – really depends on the specifics (without knowing the site by site specifics, I'd take a 200 acre single block of habitat over a checkerboard of sites that add up to 400 acres [but with no single one being larger than 50 acres]).

While I know this is a difficult political situation, as I read the document, a project-by-project approach will still be in effect, albeit slightly constrained and goal oriented. That approach is not my favorite. In a perfect world, I'd start setting up central/core preserves now, buying out those whose parcels are deemed critical to the conservation goals – using money from others within the conservation area who are in areas known to provide some benefit to the covered species, but are in areas not deemed critical. Once the initial core areas are secured, a project-by-project approach can be layered into the system.

Maybe starting with some core area can completed via external mitigation banks, maybe this document/agreement can mandate its own. In any event, defining a real central/core area within each conservation zone and building a preserve from the central/core area is necessary.

A second point on use of terms – I hope that you really aren't trying to target the minimum extent necessary. Given the vast uncertainties of CTS and natural systems, doing minimum will undoubtedly fail in its conservation objectives.

As for the discussed mitigation ratios: a 2:1 mitigation ratio results in a 33% loss of habitat – this should be the absolute minimum ratio for any wetland area supporting covered species.

2. Does the Conservation Strategy reflect a balance between proposed wetland restoration and creation projects and preservation of adequate aestivation habitat for CTS? Will the listed plant species benefit from this approach?

   The 2200 feet away from breeding locations is fine way to include enough uplands with specific breeding locations – as long as there aren't barriers. The majority of CTS are found within 500 meters of the breeding site = this finding fits well with the 95% within 2200 feet.

   The acreage discussed should serve the plants well – but some management will be required in order for the plants to persist.

3. Do the proposed migration corridor requirements reflect the needs of CTS based on life history and potential barriers to seasonal movement?

   I hate constructed corridors – they rarely work. Linking "core" areas with blocks of habitat – suitable for year-round residence are fine. Trying to design CTS freeways should be avoided. As for a tunnel under a road – that is not a corridor, that is a tunnel under a road. They actually do accomplish some good, but it is hard to justify the expense of tunnel construction and maintenance.

   Bottom-line is that no new roads should be constructed through areas deemed of critical importance. And relocation of existing roads should be mitigation option. Retrofitting existing roads with curbs and tunnels may help a little, but the roads will always be an issue.

   That said, the 500-foot wide "corridor" mentioned seems potentially ok—more of a block of habitat than a corridor – as long as human intrusion into these areas is a minimum (= no roads).

   What kind of "funneling fencing" is proposed? (= how do the animals know they are headed through a corridor?). Barriers on the sides are great (and necessary), but what is the extent of methods used to orient animals to the corridor?

4. Are the measures set forth in the Conservation Strategy effective for assuring CTS movement between conservation areas bisected by roads, streams, or flood control channels?

Short answer – no.

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1) Given that there is going to be a net loss of habitat – the existing level of take caused be roads and traffic may prove too much for the CTS. Things are changing, so it is incorrect to assume that any given population can withstand the same level of existing impacts just because they have in the past.

2) A project that increases the amount of traffic – along an existing road – is definitely something that needs mitigation.

3) CTS can and do traverse rolled curbs – inclusion of nice rolled curbs, however, should not be taken to imply that a new road or trail has no impact.

4) "..excellent passageways/under crossing.." Window dressing. The features described need to be required, but as with rolled curbs, a road is a road – and do not site new roads in critical areas. I'd much rather lose some acreage and have a road as a boundary than have a "well designed" road go through somewhere important.

5) Buried pipelines – no real problem. It is good idea to have "utility corridors" where multiple utilities are buried. Preconstruction survey, monitoring of construction, fencing around site, and seeding with appropriate plants……The usual construction stuff is fine

6) Ditches/creeks. These are tough. CTS can clearly cross these sometimes, but I've also seen them washed away. My impression is that CTS really try to avoid flowing water. So on rainy nights when CTS are migrating, ditches and creeks can be real barriers.

5. Given the layout of the Air Center conservation area, can it be considered viable component of the Conservation Strategy?

   Air Center = ?

6. Are the measures outlined in the Conservation Strategy adequate to ensure that migration is successful within the 500-foot corridors (i.e., barrier fencing, raised curbs, road under-crossings, or other protective measures)? Are the 500-foot migration corridors adequate for seed dispersal and genetic exchange between isolated populations of listed plant species?

   Seed dispersal – what is the agent of seed dispersal for these plants – water? Maybe birds and possibly ants/beetles. Given the corridors were designed for CTS, and CTS do not transport seeds, there may be no link between corridor design and seed dispersal. Check water flow patterns and see if any animal vectors are transporting seeds. My guess is that most of the sites are already functionally isolated from one another – and rare dispersal is caused by birds or downstream flooding. Presumably bird dispersal will not be altered, but the hydrologic regime will undoubtedly be changed.

In any even, seed transport by humans is not too difficult and may be called for in order to keep "viable" numbers of individuals at preserve sites.

Pollination -- again, who or what is doing the pollinating. And do the species in question require pollination by an outside source (or are they a bunch of selfers?). If they need a pollinator, then bumblebees, solitary bees, and a host of other insects need to be taken care of. Usually this isn't too much of a problem – but local pesticide use, loss of nesting locations (= uplands, usually), and competition from non-native can cause problems.

7. Are the migration distances described in the literature applicable to the Santa Rosa Plain? What additional studies in which portions of the Santa Rosa Plain might shed light on the distance traveled by the majority of CTS?

   A lot of good work went into this document. The distances are fine – and trying to fine-tune them would likely not add to the discussion. Identifying exactly where CTS are hanging out in the non-breeding season is always useful – as is finding out if they have migration routes (or do they migrate spread across a broad front – as at Stanford). If there are real existing routes (= areas where CTS concentrate during their migrations) preservation of these would help the overall conservation process.

8. Does the Conservation Strategy adequately address connectivity between listed plant species?

   I doubt that the question of what is the geographic extent of the population(s) of the covered species has been addressed by any of the studies. So the species in question may exist in already isolated populations – or the plants at different locations could be part of a single diffuse population. If I had to guess, I say that most of the different locations are already isolated populations – therefore the issue of connectivity is moot.

9. Does the Conservation Strategy reflect the most recent findings in the literature regarding minimum size, shape, and characteristics of plant preservation areas?

   Well, the Conservation Strategy is long on good policies and guidelines, but I'd rather see some specific reserves with specific management plans. The target acreages are good. As with CTS roads and other in-holdings will cause nothing but trouble. Succession will be an issue, management will be an issue, fire control will be an issue, hydrology will be an issue, and control of non-native species will be an issue

10. Does the Conservation Strategy adequately address preserve management actions and land uses necessary to assure viable habitat for CTS and listed plant species?

Doubtful. The strategy has the real potential to create a bunch of mini/moderate reserves associated with individual projects and a few minor mitigation banks. I doubt that such a reserve system will provide for a reasonable chance for long-term persistence of the listed species.

11. Do the preserve selection criteria adequately address the conservation of CTS and listed plant species?

    Generally the criteria are sound, but I'd do the classification now – both to try out the whole system and to, hopefully, get the system up and running. I don't want future decision makers to have too much flexibility – yes I know that is what you wish, but that will result in a piecemeal approach…

12. Does the Conservation Strategy adequately address transplanting/relocation (of seed) to establish new populations as an appropriate conservation tool?
13. Does the Conservation Strategy appropriately address translocation of CTS as an appropriate conservation tool?

The document does a decent job of describing the use of translocations. As noted, translocations are reasonable when trying to establish new populations—either in completely new sites or in sites that formerly supported target species. All translocations need to be monitored carefully – while spreading some seeds around is not a huge risk, moving CTS to an unsuitable site is problematic (unless large numbers of CTS are being "ranched" for the purpose). Folks need to keep in mind that local extinctions are not all that uncommon, and that recolonizations are also part of the natural system. So humans helping things along is not too crazy an idea – especially since we've likely made it much more difficult for things to naturally recolonized sites.

Salvaging individuals from sites being bulldozed, however, is not stellar conservation. It needs to be done, but is not part of an effective conservation plan.

14. Are the CTS and listed plants data on the Conservation Area maps acceptably complete and accurate?

Hard to tell. The maps need to be larger in order for a better review.

New Questions

1) mainly addressed, but the following will be addressed further:
Will fragmented preserve areas, resulting from economically driven selection of noncontiguous parcels within areas ….be adequate for long-term preservation of CTS? --- NO – a checkerboard of small reserves is not ok.
Are the guidelines strong enough? – guidelines never are.

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PEER REVIEW COMMENTS

2) I'd much rather have some smaller (~200-300 acre?) reserves that are intact and functioning than a fragmented reserve "system" consisting of left over pieces. While you cannot go too small without major management commitments, you likely can go somewhat smaller. Getting less than 1:1 mitigation (or 2:1 for that matter) for take of federally protected species is, however, not in the best interests of conservation.

3) What do you mean outside the conservation areas? Off-site mitigation? In the Central Valley? Or are there adjacent areas of suitable habitat? If there are adjacent sites occupied by the target species they should be included in the conservation areas and planned for accordingly. Politics be dammed. As for disjunct, isolated, and small preserves

4) Again, I don't like corridors. There are few, if any, studies that can provide specific recommendations to the current planning process. If you must try to link distant preserves, make it a habitat linkage and as wide and topographically correct as possible. And try to devise some why to help orient dispersing individuals and be prepared for lots of management (vegetation, squirrel, etc…)

5) Addressed already.

6) Maybe – I'd be very tempted to trade the entirety of this area for much larger reserves in the others – but that would require some more information of distribution and abundance of CTS.

7) Roads are roads. No amount of fluff will make them ok. Better yes, ok no.

8) Unknown. There are always exceptions – but all of the CTS populations I've worked on or encountered were pretty similar. The mean distance migrated undoubtedly changes with local topography and land use, but I suspect the basics stay the same.

9) Reasonable outline. Vegetation management will be key (both by people and by grazing). As will issues related to the hydrology of the sites – and potential succession issues (are the wetlands themselves stable now that the region has changed? or are they themselves changing). CTS larval sampling doesn't need to be done every year.

10) All-in-all, I'd apply the criteria now – and see what you get (I'm assuming that this has been done – a parcel-by-parcel evaluation). Then run some development scenarios and see where the problems lie – does it work?. Generally, I think such criteria are informative, but future implementers can manipulate them for fun and profit.

11) Addressed.

12) Translocations in order to remove individuals from out of the way of bulldozers are a real last resort. I'd do it, but it is not part of any real conservation plan. Moving them around to further conservation goals (establish new populations or reestablish extirpated ones) is very reasonable.

13) Probably so – In general, 11X17 maps covering 150 + square mile do not convey information too well. A much larger map would have been helpful. As would close-up maps of each of the conservation areas. Fortunately the data collected were from numerous sources, and not simply the CNDDB (which is fine, but can be very limited in its content). An expanded map specifically showing surveyed sites and un-surveyed areas would be useful.

14) If they are managed well, and not too fragmented (100+ acres of continuous "core" areas), probably yes (with long-term being 25 years). If they are highly fragmented, probably not (they'll be functional extinctions within a decade).

15) Given the "cookbook" of options listed, if properly implemented (= not a project-by-project approach), there should be enough support as to allow for the local persistence of the target species – if and only if the creation of some central/cores reserves can occur ASAP. A project here, and a project there and the whole thing drags on……and there are small reserves here and smaller ones there…….then species will not persist.

16) First of all if the original wetland was "healthy" and supported listed species, 1:1 is a terrible ratio for conservation purposes. Why trade an existing wetland that supports native species, and has for some length of time, for an unproven/recently-constructed hole in the ground? There needs to be a reasonable trade in order to account for the added level of risk. If the wetlands in question are stock ponds (which are widely used by CTS), then a 1:1 trade is slightly more acceptable – but only slightly so since the stock ponds presumably have been in existence for some time (decades?). If the wetlands are natural – and have been in existence for 100s if not 1000s of years – then the mitigation needs to exceed 1:1.

As for worry that creation of wetlands will significantly reduce the amount of upland, remember that there is a functional limit as to how far the majority of CTS will travel from a breeding site. Put in a new breeding site and presumably the range of available upland will expand accordingly.

Every time I build a new pond, I measure out a 500-meter line (in your case you'd use the 2200 foot line) denoting where most of the salamanders will reside. I don't site a pond in a location that doesn't have the "full" amount of upland, and I try to place new ponds in areas that facilitate CTS use of previously unoccupied uplands.

As for creating the new wetlands – the usual preconstruction surveys, and phased construction need to occur (first mow or otherwise clear vegetation, and check any potential burrows, then when clear, start construction, with a monitor on site…).

I would consider it inappropriate to build a new wetland on an upland area that is found to support an unusually high concentration of CTS – a few displaced CTS is no problem (= proportional to the amount of land being altered: if creation of a new wetland is destroying 1% of the uplands within 2200 feet of a breeding site, a few % of the total

CTS in the areas would be expected to be impacted), but there could be cases where for some reason, a significantly higher percentage of the non-breeding CTS might occupy a comparatively small area – I haven't seen such a situation yet, but I always do a quick check prior to siting new ponds – I'd hate to destroy an key feature of the landscape. (Again, I haven't seen this in CTS, and have looked – but I have encountered such hard to explain concentrations of target species in many of the other species I've worked with).

APPENDIX L
PEER REVIEW COMMENTS

Peer Reviewer # 5

December 3, 2004

Subject: Peer Review of the Santa Rosa Conservation Strategy

Note: My expertise is primarily with the California Tiger Salamander, and I have restricted my comments to aspects of the plan that relate to that species.

Overview:

The stated purpose of the Santa Rosa Plain Conservation Strategy (SRPCS) is to "produce a strategy for habitat conservation and enhancement of listed species on the Santa Rosa Plain" (SRPCS p. 3). By aiming to preserve the species throughout its distribution (SRPCS p. 4), recognizing the key importance of both terrestrial and aquatic habitat, and including consideration of metapopulation dynamics and principles of landscape ecology into the draft strategy, the authors of the strategy take an appropriate approach to this task. However, while the basic approach of the strategy has merit, the specifics of the plan are flawed, and my assessment is that the strategy, as currently formulated, is unlikely to succeed. Below I have provided my specific criticisms of the strategy and suggestions for changes to address those criticisms. Because the overall approach is sound, I think it is possible that the specifics of the strategy could be altered to more effectively accomplish the mission of species recovery.

My specific criticisms are as follows:

1. Further loss of habitat
The fundamental shortcoming of the strategy is that the Sonoma California Tiger Salamander (CTS) is declining primarily because of human-caused habitat loss (Wooten 2002), and further habitat loss will occur under the plan. It is estimated that more than 80% of the vernal pool habitat has been lost from the Santa Rosa Plain (Patterson et al 1994), along with high proportions of upland habitat. Despite the designation of the nine new conservation areas and the increased amount of preserved land proposed in the draft strategy, the result of adoption of this plan will be less actual CTS habitat on the ground. While some habitats--perhaps even some of the best habitats--will be protected from future development, there will be a further overall reduction in the amount of CTS habitat, which is the leading reason for the endangerment of the species in the first place. If the species is declining under current conditions, there is no reason to think that further habitat loss will produce recovery.

The only way that further habitat loss could lead to recovery, is if remaining habitat were to be improved to the extent that the improvement *more than compensated* for continued

habitat loss. The measures for mitigation in the current draft to not appear to meet that standard (see below).

2. Inadequate mitigation standards

As stated above, the only hope for recovery of a species threatened by habitat loss under a plan that includes continued habitat loss, is improvement of remaining habitat. In theory, this could be done through mitigation, but the mitigation proposed in the strategy would not improve conditions enough to offset the habitat loss that would occur under the plan. At the outset, it should be noted that compensatory mitigation (i.e., habitat creation to replace destroyed habitat) is often unsuccessful, and therefore the proposed 2:1 mitigation ratio is likely to be too low (Zedler and Callaway 1999). If mitigation is expected to bring about an improvement in the species status, the implication of a 2:1 mitigation ratio is that the mitigation will fail substantially less than 50% of the time. Studies of the outcomes of wetland restorations suggest that is overly optimistic. On the other hand, there is reason to think that mitigation may have the potential to provide CTS habitat. CTS have been found to use artificial breeding pools for breeding (Trenham et al. 2000, Cook, Northen, and Stokes *unpubl. data*) and inhabit diverse upland habitats if necessary conditions are met (e.g., LSA 2004). In light of past mitigation failure rates and the many unknowns involved, a more conservative mitigation ratio of 3 or 4 to 1 would be more credible. Further research on the effectiveness of mitigation on the Santa Rosa Plain could result in later reduction (or increases) of this ratio.

Even if the mitigation ratio is revised upwards, the measures proposed in the draft will produce insufficient benefits to the CTS to overcome the additional habitat loss. I suggest the following additions to the proposed mitigation measures:

-- Increase the number of breeding pools in areas where none exist but which have otherwise appropriate habitat. In particular, expand breeding pools in areas likely to re-establish metapopulation function within and between conservation areas.

-- Provide salamander crossing routes across major barriers between conservation areas (e.g. Highways 12 and 101).

-- Require mitigation for some apparently minor projects that are likely to have effects on CTS. Unfortunately, the threats to species encompassed under the rubric of habitat loss often constitute a death by a thousand cuts, and each of the cuts-- though minor in itself-- must be addressed in order to protect the species. For example, swimming pools are cited as an example of a project that would have insignificant effects on CTS (SRPCS p. 14). However, small losses of habitat have a cumulative effect, and a swimming pool can be a CTS trap. Another example is any project involving a curb or other CTS barrier. Such small projects should be subject to mitigation and CTS-friendly construction standards.

-- The 1.3 mile figure (the distance from CTS occurrence within which mitigation is required) should be subject to revision based on potential expansion of conservation areas (#4 below), reestablishment of landscape connectivity (#5 below), and findings of future research. Research to establish CTS use of its terrestrial habitat should be specified in the strategy.

-- The prescribed mitigation for roads should be increased. Roads are a particularly

serious threat to amphibians (Houlahan and Findlay 2003), and have an impact out of proportion to their aerial extent. It is a good idea to offer smaller CTS mitigation ratios for roads incorporating CTS design features, but a 1:1 mitigation ratio implies that there is no negative effect of the road beyond the lost habitat. This is highly unlikely. At the very least, the road will be a filter to movement. I suggest a mitigation ratio of 2 : 1 for CTS-friendly roads. Roads without CTS design features should have mitigation of 3 : 1 or higher.

-- Mitigation should target the retrofitting of existing built features, such as curbs, roads, etc. that are barriers to CTS movement. Again, improvement of habitat is the only way that compensate for reduced amount of habitat.

3. Probable unfavorable preserve configuration

The plan describes reserves in terms of acreage only, and does not spatially define them. While a recognition of the importance of upland habitat and reserve size in conserving a species is a good first step, the spatial configuration of a preserve is critical to its success in maintaining the species and must be considered in the strategy. The minimum area to be conserved in the proposed conservation areas is based on the radius (2200 ft) encompassing 95% of adult and subadult movement in a study of a breeding population in Solano County (SRPCS p. 10, from Trenham and Shaffer *in review*). However, this value has little meaning without a definition of the shape and location of the protected lands. A highly fragmented preserve is less likely to sustain viable populations than a consolidated contiguous preserve. Given the piecemeal way in which lands are to be added to the conservation areas under the plan, it is highly unlikely that the conserved lands will be aggregated in large-radius unfragmented areas around breeding sites. This is acknowledged in the SRPCS (p. 5). Just as important as total acreage is habitat quality, location, and distance with respect to breeding ponds.

How to exercise more control over preserve configuration under the proposed mitigation banking scenario is admittedly a difficult question. A prioritization algorithm that considers habitat quality and spatial configuration, and reflects contingency and evolving reserve configuration will be required. More difficult will be arranging for the acquisition of particular high-priority parcels. This will be a challenge, but essential for the success of the strategy.

4. Failure to support metapopulation dynamics

Small populations are highly prone to extinction. Most, if not all of the proposed conservation areas are likely to contain small populations of CTS. Such populations are only likely to persist in the long term through movement of individuals between pools and pool complexes, resulting in genetic exchange between subpopulations as well as augmentation, recolonization, and rescue of subpopulations that have declined or become extinct. Prior to anthropogenic alteration of the Santa Rosa Plain, numerous vernal pools scattered across a landscape dominated by oak grassland vegetation constituted a large, mostly continuous, mosaic of suitable upland and aquatic CTS habitat. In this environment, the Sonoma CTS population probably functioned as a large metapopulation,

with sub-populations centered around vernal pools or pool complexes. Maintenance, or re-establishment, of metapopulation function will be necessary for the long-term conservation of a species characterized by this kind of population structure (Marsh and Trenham 2001, Semlitsch 2002, Houlahan and Findlay 2003).

The current draft strategy does not provide sufficient connectivity between conservation areas to sustain this metapopulation structure and is likely to result in five-to-nine isolated extinction-prone populations. An important improvement in the plan would be to foster habitat acquisition, cross-barrier movement (e.g. accommodation for crossing roads), and vernal pool creation in locations that would facilitate movement between conservation areas. Such inter-area linkages should be explicitly prescribed by in the plan. Conservation areas should be expanded in the direction of neighboring conservation areas, and pools created and surrounding upland habitat conserved. This would have the effect of reversing some of the anticipated habitat loss by providing new habitat where CTS may not currently exist, and increasing connectivity (a stepping stone) to the next conservation area. This measure may be allowable in the SRPCS under 5.1.1 (2b) (p. 10).

5. Need to accommodate terrestrial movement, particularly by subadults

In many species, it is the subadults that account for the majority of the dispersal and provide the majority of movement on which metapopulations depend. The little available data (Trenham and Shaffer *in review*) suggests this is true for CTS as well. The proposed strategy has two shortcomings with regard to subadult dispersal. First, because there is so little information available, research needs to be undertaken to determine patterns of movement of CTS on the Santa Rosa Plain. Given that landscape and habitat variables are likely to have an effect on how far individuals move, it is important to establish values from field data on the local population. It is possible that the Sonoma CTS disperses shorter distances than other populations. Or much farther. This information is critical to the success of the strategy, and should be established.

Second, studies of many animal species have found that metapopulation function can be sustained by very low rates of interchange between subpopulations. Thus, comparatively rare long-distance subadult dispersal events may be important in maintaining genetic diversity and recolonization of currently vacant sites. Thus, while the 2200 foot figure is a good starting point (It was estimated that 95% of subadult movement occurred within this distance of a breeding site (Trenham and Shaffer *in review*), it may be that to successfully maintain metapopulation function of the Sonoma CTS, the plan must accommodate more than 95% of subadult movements. More research is needed on this point, and this should be explicitly called for in the plan.

These considerations, and those relating to metapopulation dynamics (#4 above), may lead to the conclusion that conservation and preserve areas must be revised upward to effectively protect the species. More information is needed to make that determination.

APPENDIX L
PEER REVIEW COMMENTS

6. Need for information

As outlined above, a great deal of additional information about the Sonoma CTS is needed. As with other ambystomatid salamanders, there is much that is unknown regarding terrestrial habitat use and terrestrial movement and dispersal (Madison and Ferrand 1998, Semlitsch and Bodie 2003). The strategy should explicitly outline the types of research projects that will be undertaken and a timeline for completion. Research related to translocations should also be specified. Finally, the draft appropriately calls for an adaptive management approach, but more specificity is needed on the mechanism for integrating research and monitoring into ongoing implementation of the strategy.

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APPENDIX M

RESPONSE TO PEER REVIEW COMMENTS

Note: This is only intended as a summary of comments and responses. The November 16, 2004 Draft Conservation Strategy for Peer Review, the peer review questions, the full set of peer review comments, and the Final Draft Conservation Strategy should be reviewed to obtain a comprehensive understanding of peer review comments, and how those comments were addressed.

QuestionNumber	Issue	Summary/Response
1	Size of preserves	Peer reviewers generally found the preserve size(s) adequate; however, fragmentation is an issue. One reviewer noted that determining the size of a preserve is as "much art as science". Where habitat is unfragmented, a few hundred acres, or fewer, might be sufficient to sustain a population. Another reviewer noted that "the piecemeal way in which lands are to be added to the conservation areas under the plan [makes] it is highly unlikely that the conserved lands will be aggregated in large- radius unfragmented areas around breeding sites. Just as important as total acreage is habitat quality, location, and distance with respect to breeding ponds." It was stated that smaller preserves require higher levels of management. It was also stated that swale systems are important for listed plants. Response: The overall goal of 3,150 to 3,800 acres is biologically supportable. As described in the Conservation Strategy this acreage must be distributed throughout the conservation areas and meet the preserve selection criteria. The proposal of 350 contiguous acres within conservation areas addresses the expressed need for unfragmented lands that are not assembled using a "piecemeal" approach. If 350 contiguous acres cannot be secured within a conservation area, than a minimum of 450 non-contiguous acres will be secured. Equally important to total acreage is the quality of habitat. The conservation areas identified are within 2,200 feet to 1.3 miles radii of known breeding sites. With the exception of two designated areas, conservation will occur outside the Urban Growth Boundaries of locally affected jurisdictions. Using the preserve selection criteria and adaptive management, appropriate monitoring of the lands will ensure procurement of high quality habitat that provides for CTS persistence, as well as a. landscape of maintained swales for plant persistence. Smaller preserves will require a more intensive management strategy.

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QuestionNumber	Issue	Summary/Response
2	Smaller preserves	Peer reviewers stated that generally larger preserves are better than smaller ones, but smaller preserves could work depending on configuration and breeding habitat. One Peer reviewer noted that an experimental approach, utilizing large, productive breeding pools in semi-rural settings would allow flexibility, but require more intense management. Another reviewer noted that the minimum preserve size should be 450 acres for a combined Kelly/Wright conservation area. The current practice of irrigation in this area is questioned if long-term sustainability of the CTS is the goal. Specific to plants, a reviewer noted that preserves with numerous pools on 100+/- acres are most likely to be successful with minimal management. Preserves of lesser size tend to degrade absent intensive management practices. An additional reviewer noted that some smaller preserves "(~200-300 acres) that are intact and functioning are preferable to fragmented systems." It was also stated that connectivity between preserves is important. Response: With the exception of the SW Santa Rosa Preserve and the Stony Point Conservation Area, the minimum preserve recommended is 350 contiguous acres. This provides an ecologically balanced approach to the preservation of all federally protected species on the Santa Rosa Plain. Studies indicate that the Kelly Farm site west of Santa Rosa is contiguous to a breeding pool and serves a CTS upland habitat. Some of these lands are irrigated. Adjustments to irrigation practices will be required if the lands are to be considered part of a preserve. In areas such as Stony Point where large blocks of land are difficult to secure, 10-30 acre blocks with up to 100 acres (total) could be established and maintained via adaptive management. Stony Point utilizes the development of satellite preserves in 100 acre blocks. The SW Santa Rosa Preserve is recognized as highly valuable. This area has some of the most productive pools for CTS and plants. Due to its fragmentation, a smaller preserve system will be maintained and intensely managed.
3	20% outside conservation areas	Peer reviewers have significant concerns about fragmentation, but generally note that the 20% outside conservation area approach is potentially viable if these lands are "linked" to the 350 contiguous acres inside conservation areas. Two reviewers note that 20% outside conservation areas may be acceptable if developed through a comprehensive planning process. Response: The creation of preserves outside of designated conservation areas is specifically identified and constrained as described in the Conservation Strategy. and will be monitored through the Adaptive Management Team.

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QuestionNumber	Issue	Summary/Response
4	Design of SWSR conservation area;corridor width	Peer reviewers' generally note that corridors for CTS are experimental and little research exists to support or refute their value, regardless of configuration. In areas where the habitat is fragmented, there is a potential gain if corridor width is calculated relative to its length and protected from predation. In terms of plants, various successful methods of dispersal exist, including human intervention. Corridors should be as wide as possible, but five hundred foot wide corridors should be adequate. Corridors should contain breeding pools. Response: Corridor widths will be related to corridor lengths, and the configuration site specific. An established corridor will, when necessary, provide protection from potential predation factors, and where appropriate breeding pools will be created to promote CTS use. The Conservation Strategy incorporated a minimum width of 500 feet for CTS movement corridors. Creation of breeding pools are also incorporated into corridors. Sufficient methods for transportation of plants exist under existing management practices.
5	Bisection by roads, streams, etc	Peer reviewers' generally note that the strategy does not adequately address roads and streams that act as impediments to dispersal. Where possible new roads should be avoided. Translocation in areas with proposed intensive development warrants consideration. Response: CTS need open spaces free of impediments to successfully disperse. In areas such as SWSR, where unimpeded dispersal is difficult, value can be derived from establishing synthetic links to other breeding and upland sites. Where possible, conservation areas have been designated to minimize these impacts, and are generally free of these barriers. In areas where these impacts cannot be successfully mitigated, translocation will be considered in the management of the species.

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QuestionNumber	Issue	Summary/Response
6	SWSR sufficient size & configuration for viable preserve	Peer reviewers' generally note that the Southwest Santa Rosa Preserve is highly fragmented, and the likelihood for long-term viability of CTS is questionable. One reviewer encourages "trade" for a larger more sustainable site. Response: The long-term viability of this area is questionable. However, it is an area that remains valuable due to its concentration of CTS and Sebastopol meadowfoam. As suggested earlier, specific to this area value can be derived from establishing synthetic links to other breeding and upland sites. In addition, the Strategy identifies this as a preserve system versus a conservation area. This recognizes the value of preservation but also address fragmentation concerns. Through adaptive management, success of this area will be monitored.
7	Migration within the corridors	Peer reviewers' generally note that corridors for CTS are experimental and little research exists to support or refute their value. One reviewer dismisses the value of corridors, but suggests linking "core" areas with habitat is a better approach. Response: Although it is difficult to assess value of corridors, in the most impacted areas, it is an experiment worth pursuing. Where possible a breeding pond will be established within the confines of the corridor. Through adaptive management, success of these dispersal corridors will be monitored
8	Different migration patterns among populations	Peer reviewers' generally note that dispersal patterns are random and highly dependent upon landscape features. Response: The term dispersal has been substituted for migration in the document. Random patterns for CTS dispersal have been documented. The Strategy recognizes that impediments to dispersal should be minimized. The focus on contiguous preserves of 350 acres attempts to assure that suitable dispersal habitat is available around breeding pools. The 350 contiguous acres or the 450 +/- non-contiguous acres per conservation area adequately addresses this random dispersal pattern. Additionally, existing rural land use(s) in the identified conservation areas generally provide some habitat value for CTS and allow for dispersal.

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QuestionNumber	Issue	Summary/Response
9	Preserve management actions sufficient	Peer reviewers' generally note that the strategy recommendations are not adequate: lacking in sufficient detail. The need to develop a detailed adaptive management plan is crucial to the success of the preserves. Response: The Strategy recommends monitoring (of specific preserves, as well as monitoring to ensure preserves are adequately developed throughout the conservation areas) as a major component of adaptive management. For all federally listed species this includes monitoring the effectiveness of corridors and the success rate of introduced populations, where appropriate. With the exception of the SW Santa Rosa Conservation area, the minimum preserve recommended is 350 contiguous acres. These preserves are of adequate size to maintain viable populations of the listed plants as well as the California tiger salamander (CTS). It also minimizes the need for intensive management activity. In areas similar to Stony Point where large blocks of land are difficult to secure, 10-30 acre preserves with breeding pools are proposed to be established and maintained within the existing rural matrix of land uses. As previously described, these would form satellite preserves within this Conservation Area. More intensive monitoring and management would be required to assure their viability. Adaptive management will be critical in assuring that these sites function property to support the listed species. The Adaptive Management Team will be formed that will help to guide monitoring, preserve management and scientific research.
10	Suitability criteria adequate	Peer reviewers' generally note the suitability of criteria for a preserve is adequate. There needs to be a relationship to breeding habitat. How the preserves are implemented is important. Response: A key component to ensuring suitability is the dispersal habitat available within 2,200 feet of a known, or created breeding site. Existing preserves such as Hale, Carinalli Toad Road, Wright, Alton Lane and the Haroutunian Open Space Parcel have documented CTS. Securing additional uplands, dispersal habitat and/or creating additional breeding pools in these areas is highly desirable and beneficial to the success of the overall strategy. Through adaptive management, where appropriate, modifications to these criteria can be made.

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QuestionNumber	Issue	Summary/Response
11	Plant translocation criteria	Peer reviewers' generally note the need for plant communities, not just isolated populations. Response: One of the key components to the strategy has been to identify lands that will function ecologically to support all protected species. The strategy emphasizes the need to preserve/create reserves that are large and contiguous in nature. Although an inter- related complex (salamander/plant) is ecologically preferable, the strategy recognizes that some pool hydrologies and locations will not always be compatible for cooperative plant and CTS persistence. Through adaptive management, where appropriate, modifications to these criteria can be made.
12	CTS translocation criteria	Peer reviewers' generally note that the criterion for CTS translocation is appropriate, but needs monitoring to ensure repopulation success. Translocation should be to areas as close as possible to the locations from which the CTS are taken. Response: There are examples of CTS translocation and repopulation success on the Santa Rosa Plain, including the Alton Lane Preserve. To maximize the future success of translocation, criteria specific to establishment is provided in the Conservation Strategy. Through adaptive management, where appropriate, modifications to these criteria can be made.
13	Figure 2 methodology	Peer reviewers' generally note that the methodology used is adequate, however additional maps are needed to judge the strategy's ultimate success. Response: Additional mapping has occurred since the methodology was presented to peer reviewers. In the future, mapping of additional information will be a key component to adaptive management decisions relative to conservation areas.

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QuestionNumber	Issue	Summary/Response
14	Conservation areas sufficient	Peer reviewers generally found that the conservation areas were sufficient. Important to success is habitat quality, location, connectivity, and distance with respect to breeding ponds. Adaptive management will be key to determining the future adequacy of the proposed conservation areas. Response: The strategy emphasizes the need for conservation areas that are contiguous, and high quality dispersal habitat within 2,200 feet of known/created breeding sites. In addition, the proposal of 350 contiguous acres per preserve addresses the expressed need for unfragmented lands that are not assembled using a "piecemeal" approach. If 350 contiguous acres cannot be secured within a conservation area, then a minimum of 450 non-contiguous acres will be secured. Monitoring and subsequent adjustments to measure the adequacy of the proposed preserve areas will be achieved through adaptive management.
15	Strategy sufficientfor CTS preservation	Peer reviewers generally note that there is a need to focus attention on creation of additional breeding pools. Large blocks of contiguous habitat are preferred. However, in areas where populations are threatened due to fragmentation and/or extirpation, core preserves need to be the focus. Attention to these will enhance the future success of the strategy. Preserves should be established for Stony Point and NW Cotati as soon as possible. Response: In SW Santa Rosa, populations should be encouraged to persist. While the mix of preserves and existing and proposed land uses are not optimal, there is value to sustaining populations in this area. Relative to the Stony Point Conservation area, the land is highly fragmented due more to ownership of parcels than to man-made impediments. In this area large blocks of land are difficult to secure; therefore, the strategy recommends securing and maintaining satellite preserves. In Cotati, known breeding sites have been lost. In areas where CTS have been extirpated, reintroduction of the species via translocation, and the creation of breeding ponds are recommended. With the exception of the SW Santa Rosa Preserve and the Stony Point Conservation Area, the minimum preserve recommended is 350 contiguous acres. This provides for ecologically functional preserves for the protected species on the Santa Rosa Plain. Using adaptive management, appropriate monitoring of preserve lands will ensure protection and maintenance of high quality habitat that provides for CTS and plant persistence.

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QuestionNumber	Issue	Summary/Response
16	Conversion of uplands to wetlands	Peer reviewers' generally note that conversion of uplands to wetlands is a concern. Newly created wetlands should not act as an impediment to dispersal. One peer reviewer noted that there are limits as to distance that CTS travel from breeding sites. Additional successful breeding sites will expand the range of available uplands. High quality uplands should not be converted to wetlands. Response: Future banks for CTS will follow a general rule of 30% wetland densities. This means 30% wetlands to 70% uplands. This addresses the major concerns expressed by the peer reviewers. Monitoring and subsequent adjustments for success can be best achieved through adaptive management.

APPENDIX N

Santa Rosa Plain Conservation Strategy
Summary of Public Comments
and Response to Comments

Note: All written and oral comments were reviewed and considered. This table is only a summary of comments.

Summary of Comments	Team Response	Disposition
Graduated mitigation ratios preferred to flat 2:1; mitigation ratios too low.	2:1 ratio accomplishes similar total preserve acreage as the graduated ratios. Applying graduated ratios long-term could encourage development beyond 500 feet from breeding sites, leaving the sites isolated without sufficient upland habitat to sustain the species.	Language was added to Section 5.3.3.1 to better explain the rationale for the 2:1 ratios.
Concerns about fragmentation; 20% outside conservation areas; need large blocks of preserve land.	The 20% outside conservation areas could lead to unacceptable fragmentation, and discourage contiguity of preserves.	Section 4.6.1, Preserve Selection Criteria, was modified to eliminate the 20% provision and allow for some mitigation outside the conservation areas, but require that it is contiguous with a conservation area and meet all other preserve selection criteria. This will reduce potential fragmentation.
Need habitat protected before permits are issued, or need a mechanism to acquire habitat in advance of impacts.	The Conservation Strategy requires, prior to permits being issued, a guarantee that mitigation will take place. While it does not require that preserves be in place prior to permits being issued, it does ensure that mitigation be developed concurrent with projects being constructed. Mitigation banks are set up in advance of impacts, and to the extent they are used, habitat is protected before permits are issued.	The Conservation Strategy adequately addresses this comment.

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Summary of Comments	Team Response	Disposition
Need to provide for preserves before SWSR habitat is lost.	The Conservation Strategy provides for mitigation to occur as development takes place; therefore, as development takes place in this area, two acres of preserve will be established for each acre of habitat loss. The document does not require that the preserves be in place prior to development.	The Conservation Strategy adequately addresses this comment.
Adaptive management needs measurable criteria and clear thresholds.	The Conservation Strategy, including adaptive management, does need criteria and thresholds.	Language was added to Section 3 to clearly identify the biological goals and objectives. The AMT will need to refer to these goals and objectives in making recommendations for changes to the Conservation Strategy.
Need sharing of cost of mitigation between new and existing development.	Section 9 identifies potential funding sources. This is an issue that will be addressed in the process of implementing the Conservation Strategy.	The Conservation Strategy adequately addresses this comment.
Redundancy needed to protect CTS; should be additional land set aside in case the mitigation is not sufficient.	The only direct mechanism for setting land aside is through mitigation of project impacts. There are other potential sources of funding identified in Section 9 that could contribute to increasing total acreage of preserves. The actual acreage of land in the conservation areas is approximately twice that which will be required for mitigation in the ten-year horizon addressed in the Conservation Strategy; therefore, additional lands could be set aside for CTS in the future. Also, the agricultural and rural residential land uses in the conservation areas will continue to contribute to habitat for the species. The success of the preserves will be monitored by the adaptive management team, and adjustments may be made over time.	The Conservation Strategy adequately addresses this comment.

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Summary of Comments	Team Response	Disposition
Conservation Strategy favors development interests over protection of CTS.	The Conservation Strategy requires that projects within 1.3 miles of CTS breeding sites mitigate at a 2:1 ratio. This ratio was deemed appropriate for the protection and improvement of CTS habitat. It was intended to allow for planned development while protecting the species. The Conservation Strategy attempts to balance development and conservation interests.	The Conservation Strategy adequately addresses this comment.
Section specific comments were received on the following: Preserve Acreage Goals, Preserve Establishment and Management, Mitigation Banks, Translocation, Monitoring, Mitigation, Surveys, Adaptive Management and Implementation.	The Conservation Strategy language needed to be expanded to address these issues.	Sections 4.5, 4.6, 4.7, 5, 6, 7, and 8 were modified to specifically address these comments.
"Shall" should replace "should" throughout strategy.	The Conservation Strategy was modified to respond to these comments.	The words "shall" or "will" replaced the word "should" throughout the document; however, there were certain cases where the word "should" was deemed to be appropriate and was not changed.
Need stronger language regarding funding of preserve management.	The Conservation Strategy was modified to respond to these comments.	Language was added to Sections 4.5 and 4.8.
Endowments should be funded up-front.	The Conservation Strategy was modified to respond to this comment to the extent that the endowments will be required as a part of mitigation as projects are approved.	Language was added to Section 4.8.

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Summary of Comments	Team Response	Disposition
Concerns about an added layer of government to oversee implementation; money should go to preserve habitat.	This will be determined through the implementation process, not in the Conservation Strategy.	Reference to the Implementing Authority in Section 8 was deleted.
Need more language regarding the Windsor General Plan; urban areas should not be in Conservation Areas; no documentation of sensitive species in this area.	Changes were made to the Windsor Conservation Area. However, projects in the Windsor area will need to mitigate for wetlands and listed plants.	The Windsor Conservation Area was modified to exclude the portion within the UGB.
Need more discussion of effects on agriculture; allowed land disturbance should be identified.	The Conservation Strategy is based on the assumption that existing agricultural and rural residential land uses in the unincorporated areas will continue.However, the Conservation Strategy Team added language recognizing that further discussions regarding agriculture will occur through the implementation process.	Section 3.2 was added to include Assumptions regarding continued land use. Section 5.4.1 was added to address conversions to vineyards and provide interim mitigation requirements. These would apply until the implementation plan is complete and the Conservation Strategy mitigation is implemented.
Needs to address common issues, such as decks, septic tanks, and similar small activities.	The Conservation Strategy does not specifically address this comment. Discussions regarding these issues will occur through the implementation process.	This issue is deferred to the implementation process.
1.3 miles out from breeding sites is too large an area to require mitigation.	CTS studies have shown that CTS travel up to 1.3 miles from their breeding sites; therefore, projects within that area are likely to impact CTS.	The Conservation Strategy adequately addresses this comment.
Management & Implementation needs to include State & Federal agencies, and technical experts.	The Conservation Strategy was modified to respond to this comment.	Language was added to Section 7, Adaptive Management to include specific reference to the various Federal, State, and local agencies, as well as technical experts.

Summary of Comments	Team Response	Disposition
Mitigation should include avoidance, minimization, mitigation on-site, and lastly, mitigation off-site (in this order).	Mitigating on-site for wetlands and plants may be appropriate in some cases, but for CTS it is generally not appropriate because it would result in preserves that would be too small to sustain the species.	Section 5.2, Minimization Measures, was added to respond to this comment.
Need to look at the whole wetland complex or area.	The Conservation Strategy encourages preserves to be large and contiguous in order to preserve an appropriate balance of CTS breeding and upland habitat and listed plant habitat.	Section 4, Conservation Areas, was modified to respond to this comment.
CTS should not conflict with wastewater irrigation; future irrigation should not conflict with CTS.	There are some instances where CTS exist on irrigated lands; however irrigated lands are not ideal CTS habitat. The Conservation Strategy does not prohibit irrigation, but future irrigation projects will need to address impacts to CTS. Discussions regarding this issue will occur through the implementation process.	The Conservation Strategy adequately addresses this comment.
Preserves should have at least 3 breeding pools and be 656 feet apart (see details).	The Conservation Strategy Team modified language to respond to this comment.	Section 3.1, Biological Goals and Objectives was added to respond to this comment and includes discussion of breeding pools. Section 4.8, Habitat Improvement was modified to respond to this comment as well.
Pools should be at least 1 foot deep, and have 0.25 acre surface area.	The Conservation Strategy Team modified language to respond to this comment.	Section 3.1, Biological Goals and Objectives, was added to respond to this comment that discusses appropriate hydrology. Section 4.8, Habitat Improvement, also addresses this comment.

Summary of Comments	Team Response	Disposition
2,070 ft around breeding sites should be in preserves or protected by land use restrictions.	The Conservation Strategy is based on the assumption that existing land uses on the Plain, which are compatible with CTS, will continue into the future. Fragmentation that has occurred on the Plain, in many cases, precludes the dedication of this much contiguous land around breeding sites.	Section 3.2, Assumptions, was modified to respond to this comment.
Minimum preserve size should be 561 acres.	The Conservation Strategy assumes that existing agricultural and rural residential land uses on the Plain will continue, and that these land uses will continue to support CTS. Also, peer review comments indicated that 350 contiguous acres, if managed properly, would be sufficient.	Section 3.1, Biological Goals and Objectives, was modified to respond to this comment. Section 3.2, Assumptions, was also modified to respond to this comment. Section 4.5, Preserve Acreage Goals, discusses the acreage required for CTS viability
Tunnels under roads should be no more than 50 feet apart (strategy says 200 ft).	The Conservation Strategy uses the reference, Proposed Design and Considerations for Use of Amphibian and Reptile Tunnels in New England (Jackson, 2003) as the basis for the 200 foot maximum distance between CTS passages underneath roadways.	The Conservation Strategy adequately addresses this comment.
Costs are too vague.	The Conservation Strategy identifies what is needed in preserve acreage to provide sufficient habitat to sustain CTS populations. It does not attempt to provide a detailed cost analysis.	The Conservation Strategy adequately addresses this comment.
Strategy fails to consider how different kinds of property at different stages of development will be treated.	The Conservation Strategy provides that projects that have received letters of no effect will not be required to mitigate. It also provides that projects that have been authorized by FWS to commence CTS surveys may proceed. In that case, if no CTS are found, no mitigation is required; if CTS are found, mitigation will be required at the appropriate level.	The Conservation Strategy adequately addresses this comment.

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Summary of Comments	Team Response	Disposition
There should be no net loss of critical habitat or species within conservation areas.	So long as projects are allowed within the conservation areas, there will be a net loss of habitat. However, most of the planned development areas are not in conservation areas, so the loss of habitat in conservation areas is not expected to be excessive. The Conservation Strategy does not prohibit projects; it only requires that projects mitigate for their impacts.	The Conservation Strategy adequately addresses this comment.
There should be no mitigation banking or translocation options for CTS; this is unproven.	Translocation is not in-lieu of mitigation. Mitigation banking and translocation are sufficiently proven to allow for these to be tools that can be used in conserving the listed species.	Section 4.6, Translocation, was modified to address this comment.
Mitigation ponds should not be allowed.	While natural CTS breeding pools are ideal, there is sufficient evidence that if breeding pools are properly constructed, they can provide viable CTS breeding habitat.	Language was added in Section 3.1, Biological Goals and Objectives, that describes appropriate CTS breeding habitat objectives.
Should be an EIR/EIS prepared on the Conservation Strategy.	The appropriate environmental documents will need to be prepared to support implementation of the Conservation Strategy. This will be more fully addressed in the implementation process.	The Conservation Strategy adequately addresses this comment.
Research programs needed for AMT.	One of the tasks of the AMT will be to identify needed research.	Section 7, Adaptive Management, addresses this issue.
Should be stronger language in purpose of Conservation Strategy committing to protection of species.	A new section was added.	Section 3, Biological Goals and Objectives, was added.

Summary of Comments	Team Response	Disposition
Preservation should be focused on the best remaining habitat.	Section 4.5.1 addresses the evaluation of potential preserves. This includes the criteria for selecting preserves, and will help to ensure that appropriate sites will be selected. While some breeding sites will end up being destroyed by development, they do not have sufficient upland habitat to sustain the species. Therefore, it would be preferable to preserve both wetlands and upland habitat to sustain both CTS and listed plants.	The Conservation Strategy adequately addresses this comment.
CTS should be protected where they are now, not moved to banks.	It is important to provide both breeding and upland habitat of sufficient size to sustain the species. In areas where CTS are surrounded by incompatible land uses, long-term survival of the species is questionable. In this case, it would be preferable to protect habitat where CTS survival is more assured.	The Conservation Strategy adequately addresses this comment.
Should be no in-lieu fees.	The use of fees is only considered in the Conservation Strategy for projects beyond 1.3 miles from CTS breeding habitat. In this case projects will be allowed to contribute to a species fund that would be applied to conservation of the species. In these areas the project would have the option to survey for the presence of CTS. If CTS are not found, no mitigation would be required; if CTS are found, mitigation would be required at a 2:1 ratio.	Contribution to a species fund is discussed in Sections 5.3.3.2 and 5.4.
Should be no provision to waive preserve selection criteria requirements.	There may be instances when a site contains some unique conservation value that is not identified in the criteria. In this case, FWS/DFG may waive one of more of the criteria, but biological justification must be provided when waiving the criteria.	The Conservation Strategy adequately addresses this comment.

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Summary of Comments	Team Response	Disposition
Former Rohnert Park casino site and Alpha Farm should be considered as preserve sites.	These are sites that could be considered for preserves in the future so long as they meet the preserve selection criteria. However, the Conservation Strategy does not identify specific sites for preserves.	The Conservation Strategy adequately addresses this comment.
Conservation areas should not extend east of 101 since it is a barrier to movement.	Generally, the conservation areas are west of Highway 101. But the Southeast Cotati Conservation Area is east of 101 because of its proximity to known CTS occurrences. The Conservation Strategy recognizes that Highway 101 is a barrier to CTS movement.	The Conservation Strategy adequately addresses this comment.
Strategy should consider other sensitive species, not just those that are listed.	The Conservation Strategy addresses only species that are currently listed pursuant to the ESA.	The Conservation Strategy adequately addresses this comment.
Should be incentives to acquire high quality habitat early in the process.	The Conservation Strategy does not require the purchase of specific sites; however, use of the preserve evaluation criteria will help to guide mitigation toward sites with high-quality habitat.	The Conservation Strategy adequately addresses this comment.
New programmatic biological opinion should include current scientific information on listed plants, and include at least as much protection as the existing programmatic biological opinion.	The Conservation Strategy assumes that a new biological opinion will be prepared by FWS, will utilize current information on listed plants, and will provide the appropriate level of protection.	The Conservation Strategy adequately addresses this comment.
Extensive comments on Appendix G – Preserve Management Template.	Some changes were made to the preserve management template, where appropriate.	Appendix G has been modified.

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Summary of Comments	Team Response	Disposition
Table 1 confusing – shows approximately 4000 acres vs. 2543 acres of preserves.	Careful review of the text of Section 4.2 should help to clarify any confusion. 4250 acres total is applied if none of the conservation areas achieves a minimum number of contiguous acres. The 4250 acres also includes existing and pending preserves. The 2543 acres would apply if all of the conservation areas achieve the minimum contiguous acreage requirement.	The Conservation Strategy adequately addresses this comment.
Concern that Implementation Committee will focus on economics and not protection of CTS.	If the Conservation Strategy is implemented as written, it will provide for the protection of CTS.	Section 8, Implementation, was modified to add items that need to be addressed in the implementation process.
Existing public lands should not be included in preserve areas – would not add to acreage of protected habitat.	Public lands are not necessarily guaranteed to remain in their current condition. Some public lands that are not included in preserves but are within conservation areas are suitable CTS habitat. Inclusion of these lands in preserves would require protections and, in most cases, habitat enhancement. It is expected that mitigation for private projects will occur on private properties.	The Conservation Strategy adequately addresses this comment.
Total of 2543 acres of preserve is too low.	The 2543 total preserve acres assumes that the minimum size preserves within all conservation areas are contiguous. It was determined by the Team, and supported by scientific peer review, that having large contiguous preserves would be ideal, and if this is achieved, the smaller total acreage would be sufficient.	The Conservation Strategy adequately addresses this comment.
Exemptions for agriculture, homes, etc would cause further fragmentation.	The Conservation Strategy does not provide exemptions from compliance with the ESA.	The Conservation Strategy adequately addresses this comment.

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Sec 8 says that USACE, NCRWQCB, DFG will relinquish their authority – locals may adopt ordinances.	The Conservation Strategy does not provide for any agency to relinquish its authority.	Section 8, Implementation, was modified to recognize roles and responsibilities of the individual agencies and adds language regarding what the implementation plan must contain.
No flow charts or timelines for the creation of preserves.	Flow charts and timelines were not provided since the preserves will be established as projects requiring mitigation occur. Timelines may vary depending on the rate of development and the rate of impact on the listed species.	The Conservation Strategy adequately addresses this comment.
Implementation Authority is only required to consider AMT recommendations, not act on them – too much power to local agencies.	The AMT is an integral part of the implementation of the Conservation Strategy. This comment will be addressed through the implementation process.	Language in Section 8 referring to the Implementing Authority has been removed. Also see modified language in Section 7, Adaptive Management and Section 8, Implementation.
Strategy allows for too much loss of CTS habitat, and is insufficiently conservative to protect the species.	The loss of habitat is sufficiently offset by the mitigation requirements of the Conservation Strategy, and that CTS will be better protected than if the Conservation Strategy did not exist.	The Conservation Strategy adequately addresses this comment.
Strategy does not consider Jan 2005 report (Cook, et al).	The Conservation Strategy considered this report, and language was added to address some of the biological issues.	Section 3.1, Biological Goals and Objectives, was modified to respond to this comment.
Preserves need to maximize quality and contiguity.	Contiguity of preserves is addressed in Section 4, Conservation Areas, which encourages the establishment of contiguous preserves.	The Conservation Strategy adequately addresses this comment.
Metapopulation function needs to be maintained or re- established, connectivity needed to avoid isolation, constructed pools between preserves.	This issue is discussed in Section 4.4, Preserve Acreage Goals.	The Conservation Strategy adequately addresses this comment.

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Need new breeding ponds.	Pursuant to Section 404 of the CWA, any wetland filled must be replaced, which will ensure that if a CTS breeding site is filled, it must be replaced with a new one. The Conservation Strategy also provides that every preserve must include breeding habitat or be in close proximity to a breeding site.	Section 3.1, Biological Goals and Objectives, has been added to address creation and characteristics of new breeding sites. Section 4.6, Preserve Establishment, and Section 4.8, Habitat Improvement, have been modified to address new breeding sites.
Preserve design, management, monitoring & research should be directed by large research institution.	The AMT will include technical experts with the appropriate expertise in preserve design, management, and monitoring. The AMT will recommend needed research.	Section 7, Adaptive Management, has been modified to more clearly define the makeup and role of the AMT.
Mitigation should be required if project is within 1.3 miles of created as well as existing breeding ponds (pg 28 footnote unclear).	Establishing mitigation requirements in proximity to newly created breeding sites would discourage the establishment of these new sites in areas that may be beneficial to CTS.	The footnote on page 28 was deleted.
Mitigate or survey opt out should be removed.	Section 5.3.3.1 requires that all projects shown on Figure 3 as "Projects Likely to Impact CTS" (generally projects within 1.3 miles of a breeding site) must mitigate at 2:1, and there is no option to survey. Projects beyond 1.3 miles from breeding may pay into a species fund or may choose to survey for presence of CTS.	Language has been added to Sections 5.3.3.2 and 5.4 to clarify the option to conduct surveys.
Consultants doing surveys should be certified.	FWS requires any person conducting a CTS survey to have a recovery permit.	Section 4.8, Management Plans, was modified to address this comment.
Should undertake appointment of recovery team, complete recovery plan, and designate critical habitat.	These are actions that FWS will undertake in the future. The Conservation Strategy does not address any of these issues.	Section 1.4, Purpose of the Santa Rosa Plain Conservation Strategy, was modified to add language regarding a recovery plan.

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Parcel-specific requests

Summary of Comments	Team Response	Disposition
Parcel no. 045-041-032, 4310 Santa Rosa Ave.	This parcel is not included in a conservation area. The Conservation Strategy does not address CTS critical habitat. The hardscape area is not considered habitat, and would not require mitigation.	The Conservation Strategy adequately addresses this comment.
Parcel nos. 144-450-036 to 043, Lund Hill Lane.	This property is within 1.3 miles of a CTS breeding site as shown on Figure 3. Projects on this property do not qualify for a "not likely" determination.	The Conservation Strategy adequately addresses this comment.
Parcel no. 047-081-041, 2500 Goodwin Ave.	This property has potential to impact CTS as shown on Figure 3. CTS surveys could be conducted or a fee could be paid to a species fund.	The Conservation Strategy adequately addresses this comment.

Corrections

Summary of Comments	Team Response	Disposition
Fig 12 Yuba Drive from Tapadera to the west is a county island, not within SR city limits.	This property is shown on Figure 12 as a county island that is located within the Santa Rosa UGB.	The Conservation Strategy adequately addresses this comment.