

Final Natomas Basin Habitat Conservation Plan



Volume 2 - Appendices

prepared by

City of Sacramento
Sutter County
Natomas Basin Conservancy
in association with
Reclamation District No. 1000
Natomas Central Mutual Water Company

prepared for

United States Fish and Wildlife Service
California Department of Fish and Game

APPENDICES

NATOMAS BASIN HABITAT CONSERVATION PLAN

CITY OF SACRAMENTO AND SUTTER COUNTIES, CALIFORNIA

July 2002

Prepared By:
City of Sacramento
Sutter County
The Natomas Basin Conservancy

In Association With:
Reclamation District No. 1000
Natomas Central Mutual Water Company

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Appendix A

Economic Analysis of Natomas Basin
Habitat Conservation Plan, dated
March 2002, by Economic & Planning
Systems, Inc.



**Economic &
Planning Systems**

*Public Finance
Real Estate Economics
Regional Economics
Land Use Policy*

FINAL REPORT

ECONOMIC ANALYSIS OF NATOMAS BASIN HABITAT CONSERVATION PLAN

Prepared for:

City of Sacramento

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March 12, 2002

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I. INTRODUCTION

PURPOSE OF HABITAT CONSERVATION PLAN

The purpose of the Natomas Basin Habitat Conservation Plan (NBHCP or the “Plan”) is to promote biological conservation in conjunction with economic and urban development within the permit areas. The NBHCP establishes a multi-species conservation program to minimize and mitigate the expected loss of habitat values and incidental take of covered that could result from urban development, operation and maintenance of irrigation and drainage systems, and certain activities associated with the Natomas Basin Conservancy (NBC, or “the Conservancy”) management of its system of reserves established under the NBHCP. The goal of the NBHCP is to minimize incidental take of the covered species in the permit areas and to provide mitigation for the impacts of covered activities on the covered species and their habitat.

The NBHCP permit area applies to the 53,537-acre interior of the Natomas Basin, located in the northern portion of Sacramento County and the southern portion of Sutter County. The Natomas Basin contains incorporated and unincorporated areas within the jurisdictions of the City of Sacramento, Sacramento County, and Sutter County. The Sacramento International Airport is also located in the Natomas Basin. The southern portion of the Natomas Basin is urbanized, but the majority of the Basin is used for agriculture.

The Conservancy, a non-profit corporation, was established to implement the Plan to ensure that sufficient habitat land is acquired, restored/enhanced, and maintained in accordance with the provisions of the Plan. The terms acquired and restored/enhanced are also intended to reflect preservation and creation of habitat land. The NBHCP requires that urban development mitigate its impact on habitat loss by paying a mitigation fee that provides funds for land acquisition, habitat restoration/enhancement, and continued operations and maintenance of habitat lands. Further, the Plan requires development to mitigate the impacts by complying with other take avoidance, minimization, and mitigation measures. The Plan covers incidental take resulting from urban development in portions of the City of Sacramento (South and North Natomas) and portions of Sutter County.

The Conservancy is responsible for collecting and managing mitigation fees, using the fees to acquire mitigation lands, and managing the mitigation lands for the benefit of the protected plant and animal species (“covered species”) living within the Natomas Basin.

Although the NBHCP covers 26 plant and animal species, the Plan focuses on two listed species known to be widely distributed in the Basin that would be impacted by anticipated urbanization – the giant garter snake and the Swainson’s hawk. The giant garter snake inhabits rice fields and drainage canals in the Basin (i.e., wetland habitats). The Swainson’s hawk generally nests along the Sacramento River and forages in the

Basin (i.e., in upland habitats). Other species are more localized or believed to be present by association with particular habitats, such as vernal pools or elderberry bushes.

The primary goal of the NBHCP is to create a system of reserves that would support populations of the giant garter snake, Swainson's hawk, and other covered species at least through the life of a 50-year Incidental Take Permits (ITPs), which is required in order for development to continue in the Natomas Basin.

Funding for the Conservancy is provided through a combination of up-front mitigation fees and on-going revenues generated from operations of the NBHCP. By incidentally providing habitat for migratory wintering waterfowl, the NBC is also projected to generate revenues from the sale of waterfowl hunting rights. The NBC will also farm and lease "managed" rice lands (enhanced for giant garter snake habitat) to farmers for additional long-term revenues. Other revenue generating activities may also be considered by the NBC in the future. Income-generating activities on NBC lands will ensure long-term funding of the operations and maintenance of habitat lands.

COURT DECISION ON HABITAT CONSERVATION PLAN

The original HCP for the Natomas Basin was adopted in 1997 and an incidental take permit (ITP) was granted to the City of Sacramento and Sutter County. However, in early 1999 certain environmental groups filed suits in state and federal courts challenging the decision of the U.S. Fish & Wildlife Service (FWS) and the California Department of Fish & Game (DFG) to approve the Natomas Basin Habitat Conservation Plan and issue incidental take permits to the city. The permits provide project construction protection for public and private project proponents from civil and criminal liability for take of endangered species that inhabit the permit area. During the litigation the parties stipulated that NBC would have continued protection of the permits in conducting its duties as plan operator under the NBHCP.

In August of 2000, the federal court judge invalidated the federal permit, ruling that the findings made by the FWS prior to issuance of the permit were not supported by adequate evidence in the record. The court found the HCP itself to be valid.

The court required that the following issues be revisited:

1. **Adequacy of funding.** Because the mitigation fee as established assumes full build out of the entire 17,500 acres located within the basin, and the city need only a portion of that allowable acreage, there is an issue as to whether adequate funding will exist if only the city is designated a permittee. Additionally, if mitigation land acquisition costs rise, how can funding sufficient to acquire the last acreage required be assured given the diminishing base over which to spread the fee burden as development proceeds?

2. **Maximum extent practicable.** The evidence is insufficient on the question of whether the mitigation imposed will, to the maximum extent practicable, reduce or mitigate the impacts of development on the protected species.
3. **FWS “no jeopardy” opinion.** Assuming that the city will be the only permittee, evidence is lacking on the question of whether there are factors that would appreciably reduce the likelihood of survival and recovery of covered species.
4. **Adequacy of environmental review.** The environmental review conducted to support the issuance of the permit was inadequate; an Environmental Impact Statement should have been prepared.

In May of 2002, FWS, the environmental group plaintiffs, certain private development interests, and the city, entered into a comprehensive settlement agreement. The agreement establishes a procedure for preparation of a revised HCP, a revised incidental take permit, and a EIS/EIR. It also allows grading and development of 1668 acres in the interim.

As part of the implementation plan for the settlement agreement, the city adopted a revised mitigation fee, consisting of a base fee portion and a “settlement premium” portion. The base fee is consistent with the fee shown in this analysis under Scenario 1, described below. The settlement premium portion was added in order to compensate for anticipated preserve land acquisition cost.

The agreement also requires acquisitions in prioritized specified areas. This requirement has an inflationary effect on land prices in the targeted areas. That effect is worsened by the need to acquire preserve land so that development can proceed.

If land prices fall significantly following adoption of a revised HCP and issuance of a new permit, and if the economic studies demonstrate that it is appropriate to do so, the mitigation fee can be reduced.

PURPOSE OF ECONOMIC ANALYSIS OF HABITAT CONSERVATION PLAN

The purpose of the economic analysis of the HCP is to address the “adequate funding” issue and the “maximum extent practicable” issue. The “no jeopardy opinion” is being addressed by the Permittees through an analysis focusing on the biological issues. The fourth cause of action, the preparation of an EIS, is currently underway by CH2M HILL. The Habitat Conservation Plan is being revised to address the issues raised by the Judge. The financial analysis presented in this document is based on the revised NBHCP.

There are five scenarios presented in this economic analysis of the HCP. Scenario 1, also referred to as the Base Case, most closely resembles the previous financial analyses of the NBHCP. It assumes 17,500 acres of development and a mitigation

ratio of 0.5 mitigation acres to every gross acre of development. Four additional scenarios are considered to address the adequate funding issue and the maximum extent practicable issue. The five scenarios are summarized as follows:

Base Case

- *Scenario 1* – 17,500 acres of development, 0.5 to 1 mitigation ratio, 25 percent marsh (per revised NBHCP).

Adequate Funding

- *Scenario 2* – 12,000 acres of development, 0.5 to 1 mitigation ratio, 25 percent marsh.
- *Scenario 3* – 8,000 acres of development, 0.5 to 1 mitigation ratio, 25 percent marsh.

Maximum Extent Practicable

- *Scenario 4* – 17,500 acres of development, 1 to 1 mitigation ratio, 25 percent marsh.
- *Scenario 5* – 17,500 acres of development, 0.5 to 1 mitigation ratio, 75 percent marsh.

All five scenarios are modeled over the 50-year permit period. A summary of findings is provided below.

REVISED HCP DRAFT EIR/EIS ALTERNATIVES

The Revised HCP Draft EIR/EIS analyzes five habitat mitigation Alternatives for the Natomas Basin. This section lists and describes these Alternatives and relates each to the Scenarios in this Economic Analysis as described above.

- **Alternative 1** – Increased Mitigation. The required mitigation ratio for land development would be increased from 0.5:1 to 1:1.
- **Alternative 2** – Habitat-Based Mitigation. Mitigation would be based on the habitat value of the land to be developed, and would include up to a 3:1 ratio for the highest-value habitat for giant garter snakes.

Alternatives 1 and 2 are most similar to Scenario 4 presented in this Report which includes a 1:1 mitigation ratio.

- **Alternative 3** – Reserve Zones. Specific reserve areas identified would be the focus of acquisition activities.

This Report did not model a scenario similar to Alternative 3 since it is not possible to identify these reserve areas in advance of habitat.

- **Alternative 4 – Reduced Development.** Development in the City and Sutter County would be reduced in order to reduce the extent of development-related habitat impacts and incidental takes.

Alternative 4 is most similar to Scenarios 2 and 3 in this Report, which include reduced development of 9,000 acres and 12,000 acres respectively.

- **Alternative 5 – No Action Alternative.** No ITP would be issued to the City of Sacramento Sutter County, Reclamation District 1000, Natomas Mutual Water Company, and a comprehensive Natomas Basin HCP would not be implemented.

Since this Alternative assumes no implementation of the NBHCP, this alternative was not modeled as part of this Economic Analysis.

NATOMAS MUTUAL AND RD 1000

In addition to the City of Sacramento and Sutter County, the Natomas Mutual Water Company and Reclamation District (RD) 1000 are potential permittees for the NBHCP. The on-going operation and maintenance activities of these agencies have the potential to impact the species covered under the NBHCP. While it is recognized that these agencies are part of the NBHCP, the economic analysis does not directly relate to their activities. These agencies will not be developing property and as such will not be required to pay NBHCP fees. Any economic or financial impacts on these agencies will be addressed separately by these agencies. It is likely that habitat mitigation provided by RD1000 and Natomas Mutual will be through changes in their O&M practices. Any costs associated with these practices currently are funded and will continue to be funded through their rate base or assessments.

BRIEF SUMMARY OF FINDINGS

- **Adequate Funding:** EPS has calculated a fee amount to implement the NBHCP for each Scenario such that the NBC will receive adequate funding throughout the 50-year permit period and beyond, i.e., annual fund balances show no deficits through the 50-year permit period. The fee estimates for each Scenario are shown in **Figure 1**. The financial model used to calculate the fees assumes land values and other costs as of 2001. There is no cap on the mitigation fee amount in the NBHCP to assure that the fees may be if adjusted if in the future costs increase, such as land acquisition costs.
- **Reduced Development:** If the number of acres of development obtaining incidental take coverage under the NBHCP were reduced from the current anticipated 17,500 acres of development within the Natomas Basin, the fee would need to be increased. Scenarios 2 and 3 model reduced development scenarios (either because development in each permit area is reduced or only 1 land use agency chooses to

participate), and as shown in **Figure 1**, the fee increases from \$5,993 under the Base Case to \$6,784 (12,000 acres of development) or \$8,641 (8,000 acres of development). The primary reason for the increase in the fee is attributed to a reduction in habitat land used for rice farming. Less rice farming acres within the NBHCP translates into less operating revenue to run the NBHCP over the long term. This results in the need for additional funds to the NBC in order to conduct management of reserve lands over the long term.

The NBHCP would be feasible under a reduced development scenario only if the higher mitigation fees were adopted as indicated in either Scenario 2 or Scenario 3. If the permittees want to insure against the possibility of a reduced development scenario in the future, it also would be recommended to adopt such mitigation fees.

- **Maximum Extent Practicable:** The fee levels for all five Scenarios were considered in addressing the question of whether the NBHCP will provide mitigation to the Maximum Extent Practicable (MEP). The MEP funding addresses one of biology, legal, and economic considerations. This report only focuses on the economics or financial considerations in specific regard to the alternative fee levels. To address these considerations, two tests were employed – 1) a comparison with other HCP fee programs in surrounding jurisdictions, and 2) a cost burden analysis for residential and light industrial development projects. Both these tests indicate that the fee levels, particularly for Scenarios 3 through 5, would be at or near the MEP from an economic or financial viewpoint based on the following findings:
 - The fees as proposed under Scenarios 1 through 5 are considerably higher than similar fees charged by other surrounding jurisdictions.
 - Cost burdens for residential development projects are currently among the highest in the region and represent approximately 13-14 percent of the estimated sales price of the residential unit. Fifteen percent is recognized as a feasibility benchmark for cost burdens based on industry “rules of thumb” regarding how property values change with successive stages of entitlement and improvement. The cost burdens include all development impact fees, permit costs, school mitigation costs, and any bonded indebtedness of the project. While 15 percent is recognized as the feasibility benchmark, up to a 20 percent cost burden may be feasible depending on the specific financial considerations of a particular project. If a project were to exceed the 15 to 20 percent range in cost burden analysis, the financial feasibility would be jeopardized.
 - The fees calculated for Scenarios 1 through 5 slightly increase the cost burdens for residential development, in some cases from 13 to 14 percent. However, recognizing that the cost burdens already push the industry standard for feasibility, the City of Sacramento has eliminated certain programs, such as funding for some police, fire, bike trails, and community center facilities. In addition, there remains the risk that as supply and demand factors for habitat land continue to push land acquisition costs upward, the fee will continue to increase, thereby pushing the residential development projects beyond the point of financial feasibility.

Figure 1
Natomas Basin HCP
2001 Required Mitigation Fees
All Scenarios

Fee Component	2000 Fee	Fewer Participants			Additional Mitigation	
		Scenario 1 Base Case [1]	Scenario 2 70% Of Plan Implemented	Scenario 3 50% Of Plan Implemented	Scenario 4 1 to 1 Acre Mitigation	Scenario 5 Base Case Wit 75% Marsh
		17,500 ac. of dev.; 1/2 ac. of mitigation per gr. acre of dev.; 25% marsh	12,000 ac. of dev.; 1/2 ac. of mitigation per gr. acre of dev.; 25% marsh	8,000 ac. of dev.; 1/2 ac. of mitigation per gr. acre of dev.; 25% marsh	17,500 ac. of dev.; 1 ac. of mitigation per gr. acre of dev.; 25% marsh	17,500 ac. of dev.; 1/2 ac. of mitigati per gr. acre of de 75% marsh
Land Acquisition Fee (LA)	\$2,125	\$2,375	\$2,375	\$2,375	\$4,750	\$2,375
Land Cost	\$375	\$625	\$625	\$625	\$1,250	\$625
Transaction Cost & Contingency	\$2,500	\$3,000	\$3,000	\$3,000	\$6,000	\$3,000
Total Land Acquisition Fee	\$423	\$368	\$368	\$368	\$736	\$1,100
Restoration/Enhancement (RE)	\$750	\$1,555	\$2,100	\$2,850	\$2,000	\$3,800
Administration/O & M	\$190	\$800	\$1,030	\$2,100	\$1,240	\$2,320
O & M Endowment Fund	\$0	\$150	\$150	\$150	\$300	\$150
Supplemental Endowment Fund	\$78	\$120	\$136	\$173	\$210	\$212
Fee Collection Administration	\$3,941	\$5,993	\$6,784	\$8,641	\$10,486	\$10,582
Total Mitigation Fee						

fee scent

[1] Base fee, along with premium fee of \$4,028, was adopted by City of Sacramento June 12, 2001.

- The cost burden analysis for non-residential projects in North Natomas and south Sutter County show cost burdens that depending on the type of development, exceed the feasibility benchmark of 10 percent for non-residential development. However this percentage could range up to 15 percent, or in some cases higher depending on the specific financial considerations of a particular project.

The cost burden analysis for commercial/retail development shows that the cost burden for development in the North Natomas area already exceeds the benchmark of 10 percent. The cost burden for commercial development in North Natomas is estimated to be 18-19 percent of the sales price per square foot. No commercial development was assumed for south Sutter County.

A range of feasibility is presented for light industrial space depending on whether the building is intended for warehousing or more expensive flex space. The average sales price per sqft is estimated to range from \$25.00 per sqft for warehouse space to \$60.00 per sqft for light industrial flex space. As such, the cost burdens also range from 18 percent for warehouse space to 8 percent for higher end light industrial space in south Sutter County.

The range for North Natomas is at 37 percent for warehouse space and 15 percent for higher end light industrial space. The cost burdens are likely to dictate what type of warehouse/light industrial projects are constructed in the each jurisdictions. Higher-end light industrial projects will be more feasible in either case, but ultimately the level of demand for these types of projects may result in a slower absorption than if a wider variety of projects were feasible.

- The City of Sacramento is currently revising the fee program for the North Natomas development area. As a result of this updated financing plan, the development impact fees are anticipated to increase significantly and will push the cost burdens closer to the upper end of the industry thresholds. The development projects in the Natomas Basin already have cost burdens that nearly meet or exceed the benchmarks for financial feasibility, and once the new fees are adopted, it is conceivable that any further increase in the NBHCP fees is likely to impact the feasibility of development projects in the Natomas Basin.
- Land acquisition prices for habitat land have increasingly trended upward since 1997, when the HCP was originally adopted. The NBHCP fee has been adjusted upward as land acquisition prices have increased. As the supply of land suitable for habitat mitigation in the Basin diminishes over time, the land acquisition price will increase (as less land will be available for reserve lands). The upward pressure on land acquisition prices would significantly increase under an HCP that required a mitigation ratio of 1:1 or higher or which required habitat land to be purchased in specified reserve areas.

While the fees associated with Scenarios 1 through 5 in this analysis do not push residential development projects out of the realm of financial feasibility, there is the very real potential that as land prices continue to increase overtime, the financial feasibility of development projects will diminish if sales prices for residential and non-residential projects do not keep pace. The impact of the mitigation fees on non-residential development, depending on the type of product, may already exceed the limits of financial feasibility.

II. OVERVIEW & FUNDING OF NBC & NBHCP

The Natomas Basin Conservancy (NBC or “the Conservancy), is a private, non-profit, public benefit corporation and it operates as the Plan Operator for the Natomas Basin Habitat Conservation Plan (the Plan). The Conservancy acquires mitigation land necessary to meet the mitigation requirements of the NBHCP. The goal of the NBHCP is to preserve, restore, and enhance habitat values found in the Natomas Basin while allowing urban development to proceed according to the local land use plans.

The Conservancy is not named in the lawsuits, but the outcome affects its ability to collect mitigation fees to support its operations. It is also true that the Judicial ruling incorporated a stipulation allowing the NBC its incidental take permit to continue to facilitate mitigation of the protected species.

The Conservancy has acquired land for habitat mitigation every year since beginning operation in January 1999. The Conservancy completed its year 2000 mitigation requirement with acquisition of the Frazer property on July 31, 2000. The Conservancy completed the acquisition of the Souza property (44.68 acres) and the Natomas Farms property (96.46 acres) in 2001.

Figure 2 summarizes mitigation land acquisition to date. Map 1 shows the location of the acquired mitigation land and the general boundary of the Natomas Basin.

Figure 2
NBHCP Mitigation Land Acquisition to Date

Property	Date Acquired	Acres
Silva	1/07/99	159.20
Betts	4/05/99	138.99
Kismat	4/16/99	40.29
Bennett (C.L)	5/17/99	226.68
Bennett (H&B)	5/17/99	132.49
Lucich North*	5/18/99	267.99
Lucich South	5/18/99	331.21
Brennan	6/15/00	241.38
Frazer	7/31/00	92.60
Souza**	7/2/01	44.68
Natomas Farms	7/9/01	96.46
Total		1,792.64

* Lucich North may be reduced from records reflecting 20.68 acres to SAFCA.

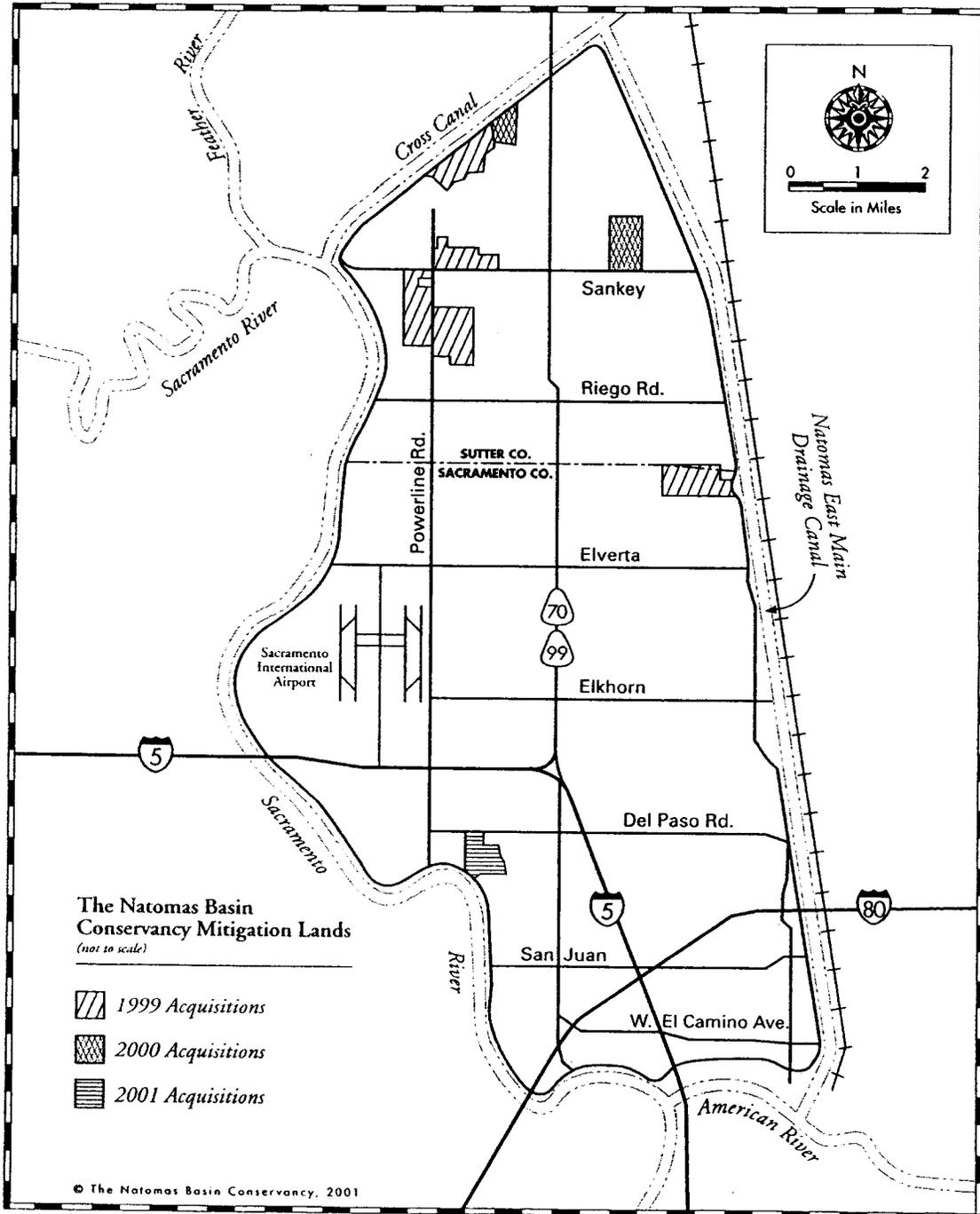
**Agreement of Purchase and Sale provides that seller can partition 4.68 acres during a 24-month period following sale.

MAP 1

THE NATOMAS BASIN CONSERVANCY

2001

Base Map



In addition to purchasing habitat acreage for preservation, the Conservancy has proceeded with habitat restoration and enhancement. At its August 2000 meeting, the Conservancy Board approved a site specific land management plan for the first 1,631 acres of mitigation land acquired. The *Site-Specific Management Plans for The Natomas Basin Conservancy's Mitigation Lands, Sacramento and Sutter Counties, California* was completed by Wildlands, Inc. in June of 2000 and provides a detailed habitat restoration and enhancement program for the following properties:

- Betts-Kismat-Silva Property;
- Lucich North Property;
- Lucich South Property; and,
- Bennett South Property.

The site-specific management plans also provide detailed instruction/direction on water, vegetation, pest, and agricultural management. Habitat monitoring, annual work plans, adaptive management, and other issues are also considered as part of the document prepared by Wildlands.

FUNDING OF THE NBC AND NBHCP

In order to provide for preservation acquisition of the habitat acreage and funding of the monitoring, restoration, and enhancement of the habitat sites, as well as provide funding for the operations of the NBC and on-going operation and maintenance of the habitat reserves, a funding plan was established in 1997 when the original HCP was adopted that utilizes various revenue sources, including:

- **Habitat Mitigation Fee** – a one-time up-front fee charged to new development on a per gross acre basis at a ratio of one-half acre of mitigation to every one acre of development;
- **Rice Revenues** – many of the properties in the habitat conservation plan will continue to be operated as rice farms. The rice farms are known to provide seasonal habitat for the giant garter snake, particularly when the rice fields are flooded. The NBC will generate revenue from leasing these properties to rice farmers.
- **Hunting Revenues** – a certain percentage of the habitat reserves were assumed to be utilized as seasonal water fowl hunting blinds, from which the NBC would earn revenues from the hunting operations.

EPS, beginning in 1995, developed a *pro-forma* financial model that analyzes the projected revenues and expenditures of the NBC dependent on a forecast of development of the Natomas Basin and the corresponding habitat mitigation required. Based on various assumptions, the financial model calculates the Habitat Mitigation Fee that would be required of new development. This financial model has been updated annually since 1998.

The financial model is currently composed of five funds:

- Land Acquisition (LA);
- Restoration and Enhancement (RE);
- Administration and Operations & Maintenance (O&M);
- O&M Endowment Fund; and,
- Supplemental Endowment Fund.

The financial model is intended to be a dynamic, fluid analysis of each of these funds and allows for interaction between the funds. The funds have been modeled over the 50-year permit period of the NBHCP. However, one of underlying goals of the financial analysis is to insure that the on-going operations and maintenance of the habitat preserves would be maintained in perpetuity (forever). Therefore, the O&M Endowment Fund, which is drawn on in later years to supplement funding of the Admin./O&M fund, is modeled such that it generates interest earnings in perpetuity. The interest earnings on the Endowment Fund, not the principal, will be used to generate funds for the management and on-going operations of the habitat reserves. The financial model has proven to be a useful tool to test how various assumptions of expenditures and/or revenues impact the fee required from new development.

To date the Natomas Basin Conservancy has been able to purchase land in accordance with the land costs and corresponding fee requirements as adopted by the NBC. As market forces have pushed land acquisition costs upward, the mitigation fee has been adjusted to account for projected increases in land acquisition costs, as well as other restoration & enhancement costs and O&M/ Administration costs. **Figure 3** shows HCP mitigation fee amounts per gross acre from 1997 to 2001.

Figure 3
NBHCP Mitigation Fee Per Gross Acre (nominal \$)

Year	Amount
1997	\$2,240
1998	\$2,656
1999	\$3,292
2000	\$3,942
2001	Base Fee - \$5,993
	Settlement Premium - \$4,028
	Total Fee - \$10,021

The Natomas Basin Conservancy has also been able to meet the timing and other requirements related to land acquisition, conversion of rice land to managed marsh, and on-going O&M administration of the Conservancy.

III. ECONOMIC ANALYSIS OF THE NBHCP

As stated in Chapter I, the purposes of the economic analysis of the NBHCP are (1) determine whether adequate funding would be available for varying levels of development and mitigation requirements and (2) whether the proposed mitigation fee would provide for mitigation which minimizes and mitigates to the maximum extent practicable. Five scenarios were developed to test the funding of the NBHCP in regard to the issues of adequate funding and maximum extent practicable.

Scenario 1, also referred to as the Base Case, most closely resembles the previous financial analyses of the NBHCP and the analysis of the current base fee amount. Under this Scenario 17,500 acres would be developed in the Basing with a mitigation ratio of 0.5 mitigation acres to every gross acre of development. Four additional scenarios are considered to address the adequate funding issue and the maximum extent practicable issue. The five scenarios are summarized as follows:

Base Case

- *Scenario 1* – 17,500 acres of development, 0.5 to 1 mitigation ratio, 25 percent marsh (with revised HCP).

Adequate Funding

- *Scenario 2* – 12,000 acres of development, 0.5 to 1 mitigation ratio, 25 percent marsh.
- *Scenario 3* – 8,000 acres of development, 0.5 to 1 mitigation ratio, 25 percent marsh.

Maximum Extent Practicable

- *Scenario 4* – 17,500 acres of development, 1 to 1 mitigation ratio, 25 percent marsh.
- *Scenario 5* – 17,500 acres of development, 0.5 to 1 mitigation ratio, 75 percent marsh.

While Scenarios 2 and 3 are geared toward evaluating Adequate Funding for varying levels of development and Scenarios 4 and 5 are geared toward determining mitigation costs consistent with the Maximum Extent Practicable (“Practicability”) finding, all five scenarios were analyzed in terms of these two issues as follows:

- *Adequate Funding for HCP over 50-Year Permit Period.* A fee level was established based on the parameters outlined for each Scenario and that provides adequate funding of the HCP for each fund account for the 50-year permit period. While the funding is modeled over the 50-year permit period, the fee levels estimated for the O&M/ Admin. fund and O&M Endowment are intended to allow the funds to be sustained in perpetuity. The fees for each Scenario are summarized in Figure 1.

- ***Financial Feasibility or “Practicability”***. Two tests were used to examine financial feasibility - 1) fee comparisons with other established or proposed HCPs in the Central Valley, and 2) total infrastructure cost burden analysis for the North Natomas area and South Sutter County areas.

Each of the alternative scenarios was analyzed by customizing the cash flow model to reflect the assumptions of each scenario. For each Scenario, the fee level(s) was determined such that the cash flow model annual fund balances were positive for the 50-year permit period. The O&M/ Administration and O&M Endowment funds are structured to go on in perpetuity (forever).

The next two chapters discuss the Adequate Funding issue and the Maximum Extent Practicable issues in regard to the financial modeling in greater detail.

IV. ADEQUATE FUNDING

Under Section 10 of the Endangered Species Act, the Service must ensure that the funding sources and levels proposed by the applicants are reliable and will meet the purpose of the HCP. The primary revenue source for funding of the NBHCP are development impact fees collected from new development paid on a per gross acre basis when a grading permit is pulled. Additional funding is projected based on the estimated revenues from leasing land owned by the NBHCP for rice farming and from the sale of waterfowl hunting rights.

The habitat mitigation fee calculated under each Scenario provides sufficient revenue to accomplish the “goals” under each Scenario. For example, under Scenario 4, which calls for a mitigation ratio of 1:1, the fee calculated provides adequate funding for each of the five funds included in the financial model. The financial model used to estimate the fee levels is discussed in Chapter VI of this Report.

Of specific concern regarding the question of adequate funding is whether or not the fee would provide sufficient funding if there is less development in the Basin than the projected total development of 17,500 acres allowable under the original NBHCP (which includes the City of Sacramento and Sutter County). If either the City of Sacramento or Sutter County were the sole participant to the NBHCP, development would approximate 8,000 acres. Scenario 2 and Scenario 3, were designed to specifically test the impacts on the fee of reduced development alternatives. These two scenarios are discussed in greater detail below.

A further consideration to determine adequate funding levels, is whether or not there will be sufficient funding to acquire the remaining acres of mitigation land if costs rise before all land acquisition is completed and all mitigation fees have already been paid.

SCENARIOS 2 AND 3 – REDUCED DEVELOPMENT

As stated above, if either the City of Sacramento or Sutter County were the sole permittee under the NBHCP, total development would approximate only 8,000 acres as opposed to the currently estimated 17,500 acres. Scenario 3, therefore, assumes a reduced development alternative of 8,000 acres. A provision of the NBHCP requires each permittee to complete a mid-point program review. The mid-point review program is designed to ensure that habitat modifications or other take would not occur before mitigation is implemented or at minimum they would occur contemporaneously. The City’s mid-point review will be completed between 4,000 to 5,000 acres of development. Sutter County’s mid-point review will be conducted between 3,500 to 5,000 acres of development. The combined total area necessitating the mid-point review is between 7,500 to 10,000 acres.

Scenario 2 assumes a reduced development alternative of 12,000 acres. A provision of the NBHCP requires an overall mid-point program review. This overall program

review is intended to provide a mechanism to evaluate the performance and effectiveness of the Plan. This program review would be initiated at the point where urban development reached 9,000 acres and would be completed before development exceeds 12,000 acres. Therefore, **Scenario 2** was structured to model a development alternative of 12,000 acres of total development.

The financial modeling demonstrated that the fee level needed to be increased relative to the Base Case to fund O&M/ Admin. expenditures under these reduced development scenarios. The primary reasons for this increase are as follows:

- ***Reduced development results in reduced mitigation acres obtained.*** Consequently, the amount of mitigation acres that can be assumed to be revenue-generating through rice/crop farm leasing or hunting is also reduced. Revenues will vary with the extent of development undertaken. A reduction in the farm leasing and hunting revenues result in the need to increase the mitigation fee for the O&M/ Administration fund as well as the O&M Endowment fund, which provides revenues to the O&M/ Admin. fund in later years of the HCP.
- ***No off-setting reduction in administrative costs is assumed relative to the Base Case.*** In the Base Case, administrative costs are reduced by 15 percent at the completion of the land acquisition phase. This same assumption is made for the reduced development scenarios based on discussions with the NBC. Therefore, at the same time revenues are decreased in a reduced development scenario, there is no offsetting reduction assumed in the ongoing administrative or the species-monitoring costs of the NBC. In other words, while revenues are estimated to be variable, expenses are considered to be fixed.

These assumptions result in the need for greater fee revenue to be generated to support the ongoing operations & maintenance functions of the NBC and the NBHCP in the reduced development scenarios. As a result, the mitigation required for **Scenario 2** and **Scenario 3** are greater than in the Base Case.

LAND ACQUISITION COSTS

All Scenarios address the question of whether or not there will be sufficient funding to acquire the last acres of mitigation land if costs rise before all land acquisition is completed and all fees have already been paid. In order to address the concern regarding funding available to purchase the remaining acres of mitigation land, a fifth fund was created – the “Supplemental Endowment Fund” – that had not previously been included in the financial model. This Supplemental Endowment Fund will allow the NBC to purchase mitigation land in advance of requirements at any point in the 50-year permit period, given sufficient funds. It would also allow the NBC to build up a monetary reserve that can be utilized in the event that at the last stages of development, land prices spike upward and not all habitat mitigation land has been purchased.

If the Supplemental Endowment Fund reserve is not required, this funding can be transferred to the Administration/O&M fund and contribute to the on-going provision of these services.

V. ANALYSIS OF FINANCIAL PRACTICABILITY

A Habitat Conservation Plan must demonstrate that it meets a number of findings in order for the US Fish and Wildlife Service (USFWS) to issue an incidental take permit. One of these findings is that the HCP minimizes and mitigates the impact of the incidental take to the "maximum extent practicable." This funding typically requires consideration of two factors: (1) adequacy of the mitigation program, and (2) whether this program is the maximum that the applicants can implement from a practical stand point.

However, there are no precise standards set forth in the law or implementing guidelines for demonstrating adherence to this condition. Nevertheless, the standard should be considered from the biological, legal, and financial perspectives. This report documents consideration of the financial perspective.

Biological considerations will generally define the areas to be preserved, restored, and enhanced as part of the HCP. The biological analysis is being addressed through a separate study conducted by CH2M Hill and May Consulting, consultants to the Permittees and the USFWS.

In general, biological goals, e.g., the extent and type of mitigation to be performed, carry with them a financial burden or cost, such as the costs of land acquisition, habitat restoration, enhancement and on-going stewardship, biological monitoring, and enforcement. The ability to meet these biological goals will depend on the availability of funding. Different levels of proposed biological mitigation will require different levels of funding, some of which may be achievable and others not.

From the financial perspective, mitigating impacts to the maximum extent practicable requires a comprehensive exploration of potential funding sources, and the establishment of secure funding mechanisms that can be expected to provide adequate funding over time. **Chapter IV** of this Report describes how adequate funding for each of the Scenarios was determined by setting a mitigation fee sufficient to meet the goals of the program on an annual basis through the 50-year permit period.

This chapter takes the fee level for each Scenario and analyzes them from a feasibility or practicability standpoint. Two methods were employed to test the financial feasibility of the estimated fees for each Scenario as described below:

- **Fee Comparison:** Comparison of the proposed fee to other fees proposed as part of other similar HCPs. If the fee is significantly above those charged in other actual or proposed HCPs, the fee may be impracticable from an equity standpoint. In other words, charging a development project an HCP fee that is much greater than those fees charged to other comparable projects, results both in an unfair burden for habitat preservation and increased infeasibility for development projects.

- **Cost Burden Analysis:** Cost burden analysis evaluates the impact of the habitat fee on the financial feasibility of a development project within the Basin. If the total cost burden on development, when including the habitat fee, is above supportable levels, some private development may not occur. This will result in a reduction in levels of development, and, consequently, less HCP funding than required as well as a series of other unintended consequences such as failure to implement a jurisdiction's General Plan or Community Plan. Setting the fee at such a level is therefore not supportable and the conservation program may not be practicable if other funding sources are unavailable.

A fee charged to new development largely funds the NBHCP. In the economic analysis, as described above, different fee levels have been estimated under alternative scenarios. This chapter analyzes the fee levels for Scenarios 1-5 under the two practicability tests—regional fee comparisons and the cost burden analysis.

FEE COMPARISONS

In order to explore the financial feasibility or practicability of the fee levels determined in this economic analysis, we have compared the Scenario 1-5 HCP fee levels to development impact fees for habitat preservation for other jurisdictions in the Central Valley region. Most HCP fees for other jurisdictions are proposed fees as the habitat conservation plans remain in the planning stages. It is also important to note that no two habitat conservation plans are alike. They differ in many respects, including types of habitat and species to be mitigated, estimated costs of mitigation, mitigation ratios, amount of outside funding, etc. Also, the fees may differ depending on whether they are funding land acquisition (fee title) costs or land easements, which would be less expensive. The NBHCP fees are based on land acquisition costs within the Natomas Basin. The fees compared are all on a per acre of development basis.

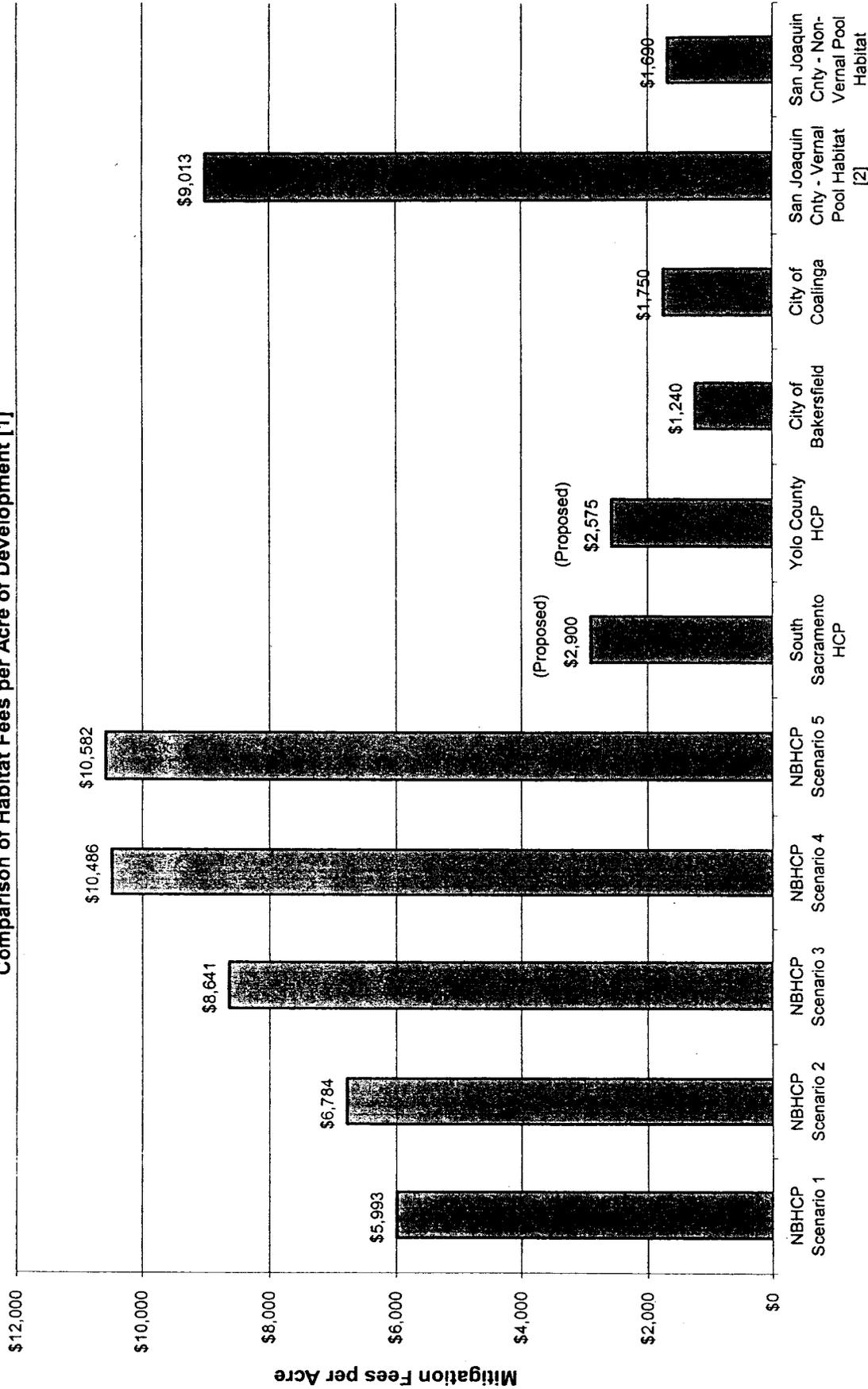
The range of NBHCP fees for Scenarios 1-5 was compared to five other Central Valley regions – South Sacramento, Yolo County, San Joaquin County, City of Bakersfield, and City of Coalinga, as shown in Figure 4.

The City of Bakersfield adopted its HCP and enacted the development impact fee of \$1,240 per gross acre in 1994. The fee has not been adjusted for inflation. The plan mitigates for four animal species and five plant species and covers 405 square miles. The City of Coalinga HCP mitigates for 22 species on over 16,000 acres of land. The City of Coalinga charges \$1,750 per acre of development.

All of the cities within San Joaquin County have adopted the San Joaquin Multi-Species Conservation Plan over the past year. Fees are collected for three types of habitat land including vernal pool habitat (average of \$9,013 per acre), agricultural lands/non-vernal pool lands (\$1,690 per acre), and multi-purpose open space land (\$845 per acre). The County of San Joaquin is currently in the process of adopting the SJMSCP.

Two habitat conservation plans are proposed for South Sacramento and Yolo County. The fee as currently estimated for South Sacramento is \$2,900 per acre of development.

**Figure 4
Comparison of Habitat Fees per Acre of Development [1]**



[1] The Habitat Plans vary by many factors including the number of species mitigated for, mitigation ratios, use of funds, amount of outside funding, etc.

[2] Vernal pool fees are proposed at \$33,802 per wetted surface acre and \$5,634 per upland acre for an average fee of \$9,013 per acre for vernal pool grassland conversions.

and covers only land acquisition and restoration costs. Funding for ongoing operations and maintenance is yet to be decided.

Yolo County HCP is proposing an average fee of \$2,575 per acre of development. An estimated 11,672 acres are planned for development and the mitigation ratio currently contemplated is one acre of mitigation to one acre of development.

The NBHCP fees for Scenario 1-5 range from \$5,993 to \$10,582, which are significantly higher than the other four jurisdictions in the comparison. Scenario 1 has the lowest fee of \$5,993, which is nearly double the next highest fee of \$2,900 for South Sacramento. The fee comparison, therefore, does give an indication of impracticability.

TOTAL BURDEN COMPARISON

EPS has also analyzed the NBHCP fees for Scenarios 1 through 5 in the context of total backbone infrastructure to compare the overall burden of backbone infrastructure in the North Natomas and South Sutter County areas. The purpose was to determine if the total burden for new development in North Natomas is significantly higher than feasibility benchmarks for single family development.

Most fees and special taxes are set on a per single family unit basis. However, some fees, such as the NBHCP mitigation fee, are determined on a per acre basis. To compare the HCP fees in relation to the overall infrastructure cost burden, the HCP fees were converted to a per unit fee amount. The fees were converted assuming an average density, or number of units per acre based upon approved dwelling unit types which may be constructed in the Basin. The analysis also looks at two housing types, 1,800 sqft and 2,400 sqft. The per acre fees were converted as follows:

	1,800 Sqft SF Unit		2,400 Sqft SF Unit	
	Fee/ Acre	Fee/Unit	Fee/ Acre	Fee/Unit
Assumed Density		7 Units/ Acre		5 Units/ Acre
Scenario 1- Base Case	\$5,993	\$856	\$5,993	\$1,199
Scenario 2	\$6,784	\$969	\$6,784	\$1,357
Scenario 3	\$8,641	\$1,234	\$8,641	\$1,728
Scenario 4	\$10,486	\$1,498	\$10,486	\$2,097
Scenario 5	\$10,582	\$1,512	\$10,582	\$2,116

The analysis focuses on two of four quadrant areas in North Natomas, Quadrant 2 and Quadrant 4, as these are the areas where the greatest amount of single family development is planned to occur. However, the analysis is applicable to all residential areas in the permit area.

EXPLANATION OF BURDEN COMPONENTS

Many jurisdictions in California charge development impact fees on new development. In addition to city/countywide fees, localities have several techniques for financing backbone infrastructure. These financing methods include project specific fees; assessment districts; Mello-Roos Community Facilities Districts; school fees and special taxes; and conditions of approval implementation through the entitlement and subdividing process.

The city/county fees are comprised of processing fees (building permit and plan check fees) and development impact fees, which may include water, wastewater, traffic, drainage, library, fire/police, and park fees. The largest of the city/countywide fees are usually one-time water, wastewater, and traffic fees. Most jurisdictions present their fees on a per square foot, per unit, or per acre basis. The building permit and plan check fees, also a component of city/ countywide fees, are usually based on the building value which is determined from per square foot value factors provided by the individual jurisdiction.

In addition to the city/countywide development impact fees discussed above, school districts throughout Northern California often require developments to pay school mitigation fees, such as Sterling Fee, and/or participate in School Mello-Roos Special Tax programs. Any school General Obligation bonds are not included in this analysis.

Backbone infrastructure that benefits a specific project or is needed to mitigate the impacts of the project on the community as a whole is usually funded through project specific fees, special assessments, or Mello-Roos CFD special taxes.

The fees and taxes discussed in this report generally fund backbone infrastructure, not in-tract on-site infrastructure. It is assumed that the developer pays for all in-tract, on-site infrastructure. However, this distinction between on and off-site infrastructure is not absolute. Areas with high project specific fees and/or high special taxes for infrastructure are more likely to have their in-tract arterials and collectors funded. On the other hand, areas without project specific fees or special taxes are more likely to have greater on-site infrastructure needs.

Taken together, city/countywide fees, school mitigation costs, project specific fees, assessments and the present value of special taxes represent the total cost of backbone infrastructure.

RESIDENTIAL BACKBONE INFRASTRUCTURE COST COMPARISON

Figure 5 and Figure 7 summarize the infrastructure cost burden on the two sample homes types of 1,800 sqft and 2,400 sqft. The existing HCP fee (on a per unit basis) is given as well as the incremental increase in the fee related to the five scenarios analyzed in this economic analysis. The average total existing infrastructure cost burden for an 1,800 sqft home in North Natomas is estimated at \$31,756 per unit, and \$36,474 per unit

for a 2,400 sqft home. The increase in the HCP fee increases the burden amount by an amount ranging from \$293 to \$949 per unit for a 1,800 sqft house to \$410 to \$1,328 for a 2,400 sqft house.

The Impact of Total Infrastructure Cost on Housing Market

Figure 6 and **Figure 8** show the total infrastructure cost burden as a percentage of the average home prices for a 1,800 sqft unit and a 2,400 sqft unit in North Natomas. Backbone infrastructure and school mitigation costs typically average around 15 percent of sales price of the house, although this cost may range from 10 to 20 percent. As the share of backbone costs starts exceeding 15 percent, the feasibility of the project starts to diminish. Either sales prices have to rise, limited by competition in the region, or the developers of the project take less of a profit. As profits are reduced to below required rates of return, the product will not be delivered in the market.

The cost burdens as they currently exist are around 13 to 14 percent of the home price for both comparisons. The increase in HCP mitigation fees per unit has little impact on the overall fee burden under all scenarios.

The City of Sacramento is currently revising the financing plan for the North Natomas area. As a result of this update, it is anticipated that the development impact fees specific to North Natomas will increase. As a result, the infrastructure cost burdens are expected to increase potentially pushing the project closer to the upper threshold of 20 percent for the overall cost burdens.

NON-RESIDENTIAL BACKBONE INFRASTRUCTURE COST COMPARISON

For non-industrial development, backbone infrastructure and school mitigation costs typically average around 10 percent of sales price per sqft, although this cost may range up to 15 percent. As the share of backbone costs starts exceeding 15 percent, the feasibility of the project starts to diminish. Either sales prices have to rise, limited by competition in the region, or the developers of the project take less of a profit. As profits are reduced to zero, the product will not be delivered in the market.

Figure 9 and **Figure 12** present a similar infrastructure cost burden analysis for retail/commercial development and warehouse/light industrial development in south Sutter County and North Natomas. Currently, commercial development is planned for North Natomas while warehouse/light industrial development is planned for south Sutter County.

Figure 9 and **Figure 10** shows the analysis for a retail/commercial development consisting of a 109,125 sqft building. The existing HCP fee (on a per square foot basis) is given as well as the incremental increase in the fee related to two scenarios analyzed in this economic analysis, Scenario 1 and Scenario 5. The average total existing infrastructure cost burden for a 109,000 sqft commercial building in the NBHCP area is estimated to be \$21.79 per sqft in North Natomas. The proposed HCP fee increases the

burden amount by \$0.19 to \$0.61 per sqft depending on the scenario. For North Natomas, the cost burdens are estimated at 18 to 19 percent of the sales price per square foot, considerably higher than the 10 to 15 percent feasibility threshold.

Figure 11 and **Figure 12** summarizes the infrastructure cost burden on warehouse/light industrial development. The analysis assumes a 100,000 sqft building. The average total existing infrastructure cost burden for a 100,000 sqft warehouse/light industrial building in the NBHCP area is estimated at \$4.15 per sqft in Sutter County and \$8.90 per sqft in North Natomas. The proposed HCP fee increases the burden amount by \$0.12 to \$0.38 per square depending on the scenario. Depending on whether the building is intended for warehousing or more expensive flex space, the average sales price per sqft is estimated to range from \$25.00 per sqft to \$60.00 per sqft. Likewise the cost burdens also range from 18 percent for warehouse space to 8 percent for higher end light industrial space in south Sutter County.

The range for North Natomas is at 37 percent for warehouse space and 15 percent for higher end light industrial space. The cost burdens are likely to dictate what type of warehouse/light industrial projects are constructed in the two jurisdictions.

DISCUSSION OF NORTH NATOMAS FINANCING PLAN SHORTFALLS

The August 1999 Financing Plan Update for North Natomas compared the infrastructure and community facility cost burdens for the North Natomas area with other projects in the Greater Sacramento region. North Natomas had infrastructure costs comparable to nearby areas, although the costs were at the high end of the range for most land uses.

To maintain feasibility of the North Natomas Financing Plan, not all facilities were funded. Several facility improvements, such as those for bike trails, fire stations, library, and police station, as well as community centers, draw on funding from other regional sources, including the City's General fund, beyond the development impact fees charged to new development. For example the North Natomas Public Facilities Fee (NNPFF) funds only the off-street bike trails, but not the separated crossings for major roads and drainage canals (estimated at \$6.8 million). Also of the two fire stations planned for the North Natomas area, the NNPFF will fund one fire station while the City is proposing fund the second station.

The residential infrastructure cost burdens of the North Natomas area remain in the range of feasibility due in large part to the fact that City planners and policy makers made a conscious decision to keep the public facilities financed in the Financing Plan reasonable. However, as stated above, the infrastructure cost burdens are at the high end of the range, and any increase in fees, including the HCP fee, pushes the burden even higher, and other facilities necessary to complete the community may go unfunded, relying on City, regional, state, and federal funding sources to provide facilities for a complete community.

Figure 5
Natomas Basin
Comparison of Burden of Impact Fees
on Residential Development - 1,800 Sqft Unit [1]

Fee Category	Sacramento County					Placer County		Yolo County	
	Natomas Basin		North Natomas Average	Sac. County Laguna West	Folsom Broadstone Unit 2	Roseville		Woodland	
	North Natomas Quadrant 2	North Natomas Quadrant 4				North Central SP	Stanford Ranch	West Sac.	Sycamore Ranch
Existing Fees, Taxes & Assessments									
City/County Fees, Excluding Mitigation Fees	\$10,782	\$10,782	\$10,782	\$12,321	\$17,597	\$21,253	\$19,903	\$19,106	\$12,772
Plan Area Fees	\$5,806	\$5,806	\$5,806	\$0	\$0	\$0	\$0	\$0	\$4,702
School Mitigation	\$6,030	\$6,030	\$6,030	\$7,332	\$5,292	\$5,585	\$9,658	\$3,690	\$9,055
Infrastructure Bonds/Assessments	\$8,593	\$8,557	\$8,575	\$9,331	\$9,826	\$13,790	\$4,569	\$0	\$2,391
Subtotal	\$31,212	\$31,175	\$31,193	\$28,984	\$32,716	\$40,628	\$34,130	\$22,796	\$28,920
Existing Habitat Mitigation Fees [2]	\$563	\$563	\$563	\$0	\$0	\$0	\$0	\$358	\$358
Total Existing Fees, Taxes & Assessments	\$31,775	\$31,738	\$31,756	\$28,984	\$32,716	\$40,628	\$34,130	\$23,154	\$29,278
Proposed Increase in NBHCP Fee Per Unit [2]									
Scenario 1	\$293	\$293	\$293						
Scenario 2	\$406	\$406	\$406						
Scenario 3	\$671	\$671	\$671						
Scenario 4	\$935	\$935	\$935						
Scenario 5	\$949	\$949	\$949						
Total After Fee Increase									
Scenario 1	\$32,068	\$32,031	\$32,050						
Scenario 2	\$32,181	\$32,144	\$32,163						
Scenario 3	\$32,446	\$32,410	\$32,428						
Scenario 4	\$32,710	\$32,673	\$32,691						
Scenario 5	\$32,723	\$32,687	\$32,705						

"Summ 1,800 Sqft"

[1] All fees shown are for Fiscal Year 2001-02.
 [2] Fee is charged on a per acre basis. This analysis assumes there are 7 units per acre.

Figure 6
Natomas Basin
Comparison of Total Backbone Cost
as a Percentage of Average Home Prices

1,800 Square Foot Unit

Districts	Project Areas	Scenario	Average Home Price [1]	Existing/Current Mitigation Fees		Proposed Increase in Mitigation Fees		Percentage of Average Home Prices
				Habitat Mitigation Fees	Average Backbone Cost [2]	NBHCP Mitigation Fees	Average Backbone Cost [2]	
NBHCP Service Areas North Natomas North Natomas	Sacramento	#1-Low	\$229,000	\$563	\$31,756	\$293	\$32,050	14%
	Sacramento	#5-High	\$229,000	\$563	\$31,756	\$949	\$32,705	14%
Major Development Areas Laguna West Broadstone 2 North Central Roseville Stanford Ranch Southport Sycamore Ranch	Sacramento	n/a	\$215,000		\$28,984			13%
	Folsom	n/a	\$261,000		\$32,716			13%
	Roseville	n/a	\$240,000		\$40,628			17%
	Rocklin	n/a	\$243,000		\$34,130			14%
	West Sacramento	n/a	\$210,000	\$358	\$23,154			11%
	Woodland	n/a	\$232,000	\$358	\$29,278			13%

Source: City of Sacramento, North Natomas Drainage CFD No. 97-01

"1,800sf%"

[1] Based on data from The Gregory Group New-Home database.

[2] Total backbone costs include city/county-wide fees, including mitigation fees, school mitigation fees and project specific fees/bonds.

Figure 7
Natomas Basin
Comparison of Burden of Impact Fees
on Residential Development - 2,400 Sqft Unit [1]

Fee Category	Sacramento County						Placer County			Yolo County	
	City of Sacramento		North Natomas Average	Sac. County Laguna West	Folsom Broadstone Unit 2	Roseville		Rocklin Stanford Ranch	West Sac. Southport	Woodland Sycamore Ranch	
	North Natomas Quadrant 2	North Natomas Quadrant 4				North Central SP	South				
Existing Fees, Taxes & Assessments											
City/County Fees, Excluding Mitigation Fees	\$11,451	\$11,451	\$11,451	\$12,583	\$18,314	\$22,155	\$20,544	\$20,761	\$13,228		
Plan Area Fees	\$5,806	\$5,806	\$5,806	\$0	\$0	\$0	\$0	\$0	\$4,702		
School Mitigation	\$8,040	\$8,040	\$8,040	\$9,354	\$7,056	\$5,585	\$10,942	\$4,920	\$9,055		
Infrastructure Bonds/Assessments	\$9,161	\$11,616	\$10,389	\$13,712	\$9,826	\$13,790	\$4,776	\$0	\$2,391		
Subtotal	\$34,458	\$36,914	\$35,686	\$35,649	\$35,197	\$41,530	\$36,262	\$25,681	\$29,376		
Existing Habitat Mitigation Fees [2]	\$788	\$788	\$788					\$502	\$502		
Total Existing Fees, Taxes & Assessments	\$35,247	\$37,702	\$36,474	\$35,649	\$35,197	\$41,530	\$36,262	\$26,183	\$29,877		
Proposed Increase in NBHCP Fee Per Unit [2]											
Scenario 1	\$410	\$410	\$410								
Scenario 2	\$569	\$569	\$569								
Scenario 3	\$940	\$940	\$940								
Scenario 4	\$1,309	\$1,309	\$1,309								
Scenario 5	\$1,328	\$1,328	\$1,328								
Total After Fee Increase											
Scenario 1	\$35,657	\$38,112	\$36,885								
Scenario 2	\$35,815	\$38,270	\$37,043								
Scenario 3	\$36,187	\$38,642	\$37,414								
Scenario 4	\$36,556	\$39,011	\$37,783								
Scenario 5	\$36,575	\$39,030	\$37,802								

"Summ 2,400 Sqft"

[1] All fees shown are for Fiscal Year 2001-02.
 [2] Fee is charged on a per acre basis. This analysis assumes there are 5 units per acre.

Figure 8
 Natomas Basin
 Comparison of Total Backbone Cost
 as a Percentage of Average Home Prices

2,400 Square Foot Unit

NBHCP Service Areas:	Average of Project Areas	Scenario	Average Home Price [1]	Existing/Current Mitigation Fees		Proposed Increase in Mitigation Fees		
				Habitat Mitigation Fees	Average Backbone Cost [2]	NBHCP Mitigation Fees	Average Backbone Cost (1)	Percentage of Average Home Prices
NBHCP Service Areas North Natomas North Natomas	Sacramento	#1-Low	\$279,000	\$788	\$36,474	\$410	\$36,885	13%
	Sacramento	#5-High	\$279,000	\$788	\$36,474	\$1,328	\$37,802	14%
Comparable Development Areas Laguna West Broadstone 2 North Central Roseville Stanford Ranch Southport Sycamore Ranch	Sacramento	n/a	\$240,000		\$35,649			15%
	Folsom	n/a	\$360,000		\$35,197			10%
	Roseville	n/a	\$290,000		\$41,530			14%
	Rocklin	n/a	\$324,000		\$36,262			11%
	West Sacramento	n/a	\$245,000	\$502	\$26,183			11%
	Woodland	n/a	\$300,000	\$502	\$29,877			10%

Source: City of Sacramento, North Natomas Drainage CFD No. 97-01

[1] Based on data from The Gregory Group New-Home database.

[2] Total backbone costs include city/county-wide fees, including mitigation fees, school mitigation fees and project specific fees/bonds.

"2,400sf"

Figure 9
Natomas Basin
Comparison of Burden of Impact Fees Per Sqft
on Non-Residential Development - Retail

Fee Category	Sacramento County										Yolo County		Sutter Co.	
	City of Sacramento		Sac. County		Folsom		Sac. County		Placer County		Yolo County		Sutter Co.	
	North Natomas Quad. 1, Basin 6	North Natomas Quad. 2, Basin 1	North Natomas Average	Laguna West	Broadstone Unit 2	Northeast Galt	Roseville	North Central SP	Rocklin	Stanford Ranch	West Sac.	Southport	South Sutter	
Existing Fees, Taxes & Assessments														
City/County Fees, Excluding Mitigation Fees	\$4.90	\$4.90	\$4.90	\$7.09	\$8.73	\$16.06	\$8.49	\$10.42		\$10.55	\$5.53			
Plan Area Fees	\$9.15	\$9.15	\$9.15	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00		\$0.00	\$0.00			
Infrastructure Bonds/Assessments	\$7.77	\$7.00	\$7.38	\$4.70	\$4.89	\$3.96	\$5.65	\$4.04		\$9.35	\$0.00			
Subtotal	\$21.82	\$21.05	\$21.43	\$11.79	\$13.62	\$20.01	\$14.14	\$14.47		\$19.89	\$5.53			
Existing Habitat Mitigation Fees [1]	\$0.36	\$0.36	\$0.36	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00		\$0.23	\$0.36			
Total Existing Fees, Taxes & Assessments	\$22.18	\$21.41	\$21.79	\$11.79	\$13.62	\$20.01	\$14.14	\$14.47		\$20.12	\$5.89			
Proposed Increase in NBHCP Fee Per Sqft [1]														
Scenario 1	\$0.19	\$0.19	\$0.19								\$0.19		\$0.19	
Scenario 2	\$0.26	\$0.26	\$0.26								\$0.26		\$0.26	
Scenario 3	\$0.43	\$0.43	\$0.43								\$0.43		\$0.43	
Scenario 4	\$0.60	\$0.60	\$0.60								\$0.60		\$0.60	
Scenario 5	\$0.61	\$0.61	\$0.61								\$0.61		\$0.61	
Total After Fee Increase														
Scenario 1	\$22.37	\$21.60	\$21.98								\$6.08		\$6.08	
Scenario 2	\$22.44	\$21.67	\$22.06								\$6.15		\$6.15	
Scenario 3	\$22.61	\$21.84	\$22.23								\$6.32		\$6.32	
Scenario 4	\$22.78	\$22.01	\$22.39								\$6.49		\$6.49	
Scenario 5	\$22.79	\$22.02	\$22.40								\$6.50		\$6.50	

"Summ Retail"

[1] All fees shown are for Fiscal Year 2001-02.

[2] Fee is charged on a per acre basis. This analysis assumes there are 7 units per acre.

Figure 10
Natomas Basin
Comparison of Total Backbone Cost
as a Percentage of Average Sales Price per Sqft

Retail Development
Assumes 109,000 Sqft Building

Project Area	District	Scenario	Average Sales Price per Sqft [1]	Existing/Current Mitigation Fees		Proposed Increase of Mitigation Fees			
				Habitat Mitigation Fees	Average Backbone Cost [2]	NBHCP Mitigation Fees	Average Backbone Cost [1]	Percentage of Average Sales Prices	Percentage of Average Sales Prices
NBHCP Service Areas:									
North Natomas [3]	Sacramento	#1-Low	\$120.00	\$0.36	\$21.79	\$0.19	\$21.98	18%	18%
North Natomas [3]	Sacramento	#5-High	\$120.00	\$0.36	\$21.79	\$0.61	\$22.40	18%	19%
South Sutter County	Sutter County	#1-Low	\$120.00	n/a	n/a	n/a	n/a	n/a	n/a
South Sutter County	Sutter County	#5-High	\$120.00	n/a	n/a	n/a	n/a	n/a	n/a
Major Development Areas									
Laguna West	Sacramento	n/a	\$120.00	\$0.00	\$11.79			10%	
Broadstone 2	Folsom	n/a	\$120.00	\$0.00	\$13.62			11%	
Northeast Area	Galt	n/a	\$120.00	\$0.00	\$20.01			17%	
North Central Roseville	Roseville	n/a	\$120.00	\$0.00	\$14.14			12%	
Stanford Ranch	Rocklin	n/a	\$120.00	\$0.00	\$14.47			12%	
Southport	West Sacramento	n/a	\$120.00	\$0.23	\$20.12			17%	

[1] Based on information provided by commercial developers and brokers.

[2] Total backbone costs include city/county-wide fees, plan area fees including mitigation fees, and project specific infrastructure fees/bonds.

[3] Backbone Infrastructure cost for North Natomas is based on the average cost of Quad 3 Basin 8c and Quadrant 1 Basin 9.

"Retail %"

Figure 11
Natomas Basin
Comparison of Burden of Impact Fees Per Sqft
on Non-Residential Development - Warehouse/Light Industrial [1]

Fee Category	Sacramento County					Placer County			Yolo County		Sutter Co.	
	City of Sacramento		Sac. County	Folsom	Galt	Roseville	Rocklin	West Sac.	Woodland	Sutter Co.		
	North Natomas	North Natomas	Laguna	Broadstone	Northeast	North	Stanford	Southport	East Main St.	South	Sutter	
	Quad 3, Basin 8	Quad 1, Basin 9	West	Unit 2	Area	Central SP	Ranch		Assess. District			
Existing Fees, Taxes & Assessments												
City/County Fees, Excluding Mitigation Fees	\$3.70	\$3.70	\$4.62	\$5.09	\$4.08	\$6.49	\$6.84	\$5.20	\$3.04	\$3.92		
Plan Area Fees	\$1.82	\$1.82	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00		
Infrastructure Bonds/Assessments	\$3.82	\$2.50	\$2.10	\$3.06	\$0.48	\$2.63	\$1.60	\$4.25	\$1.62	\$0.00		
Subtotal	\$9.33	\$8.01	\$6.72	\$8.15	\$4.56	\$9.12	\$8.44	\$9.45	\$4.65	\$3.92		
Existing Habitat Mitigation Fees [2]	\$0.23	\$0.23	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.14	\$0.14	\$0.23		
Total Existing Fees, Taxes & Assessments	\$9.56	\$8.24	\$6.72	\$8.15	\$4.56	\$9.12	\$8.44	\$9.60	\$4.80	\$4.15		
Proposed Increase in NBHCP Fee Per Sqft [2]												
Scenario 1	\$0.12	\$0.12										\$0.12
Scenario 2	\$0.16	\$0.16										\$0.16
Scenario 3	\$0.27	\$0.27										\$0.27
Scenario 4	\$0.38	\$0.38										\$0.38
Scenario 5	\$0.38	\$0.38										\$0.38
Total After Fee Increase												
Scenario 1	\$9.68	\$8.35										\$4.27
Scenario 2	\$9.72	\$8.40										\$4.31
Scenario 3	\$9.83	\$8.51										\$4.42
Scenario 4	\$9.94	\$8.61										\$4.52
Scenario 5	\$9.94	\$8.62										\$4.53

"Summ Lr Ind"

[1] All fees shown are for Fiscal Year 2001-02.

[2] Fee is charged on a per acre basis. This analysis assumes there are 7 units per acre.

Figure 12
Natomas Basin

Comparison of Total Backbone Cost
as a Percentage of Average Sales Price per Sqft

Warehouse Light Industrial Development
Assumes 100,000 Sqft Building

Project Area	District	Scenario	Average Sales Price per Sqft [1] <i>Low - High</i>	Existing/Current Mitigation Fees			Proposed Increase of Mitigation Fees		
				Habitat Mitigation Fees	Average Backbone Cost [2]	Percentage of Average Sales Prices	NBHCP Mitigation Fees	Average Backbone Cost [1]	Percentage of Average Sales Prices
NBHCP Service Areas:									
North Natomas [3]	Sacramento	#1-Low	\$25.00 - \$60.00	\$0.23	\$8.90	36% - 15%	\$0.12	\$9.02	36% - 15%
North Natomas [3]	Sacramento	#5-High	\$25.00 - \$60.00	\$0.23	\$8.90	36% - 15%	\$0.38	\$9.28	37% - 15%
South Sutter County	Sutter County	#1-Low	\$25.00 - \$60.00	\$0.23	\$4.15	17% - 7%	\$0.12	\$4.27	17% - 7%
South Sutter County	Sutter County	#5-High	\$25.00 - \$60.00	\$0.23	\$4.15	17% - 7%	\$0.38	\$4.53	18% - 8%
Major Development Areas									
Laguna West	Sacramento	n/a	\$25.00 - \$60.00	\$0.00	\$6.72	27% - 11%			
Broadstone 2	Folsom	n/a	\$25.00 - \$60.00	\$0.00	\$8.15	33% - 14%			
North Central Roseville	Roseville	n/a	\$25.00 - \$60.00	\$0.00	\$9.12	36% - 15%			
Stanford Ranch	Rocklin	n/a	\$25.00 - \$60.00	\$0.00	\$8.44	34% - 14%			
Southport	West Sacramento	n/a	\$25.00 - \$60.00	\$0.14	\$9.60	38% - 16%			
East Main St.	Woodland	n/a	\$25.00 - \$60.00	\$0.14	\$4.80	19% - 8%			
Northeast Area	Galt	n/a	\$25.00 - \$60.00	\$0.00	\$4.56	18% - 8%			

"Lt Ind %"

[1] Based on information provided by commercial developers and brokers.

[2] Total backbone costs include city/county-wide fees, plan area fees including mitigation fees, and project specific infrastructure fees/bonds.

[3] Backbone Infrastructure cost for North Natomas is based on the average cost of Quad 3 Basin 8c and Quadrant 1 Basin 9.

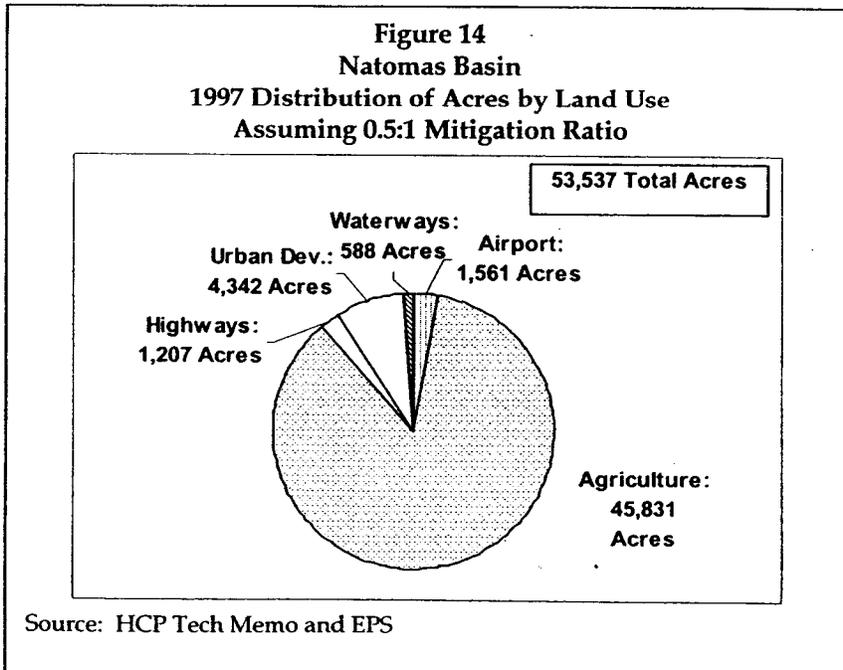
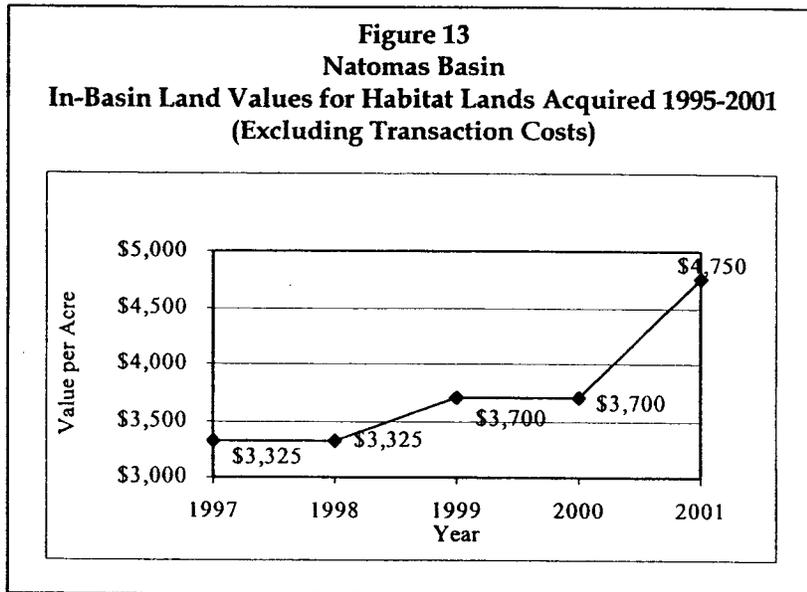
CURRENT CONDITIONS VERSUS FUTURE CONDITIONS

As discussed in an earlier section of this Chapter, the proposed increase in the NBHCP fee from the 1999 fee level, is projected to have minimal impact on the cost burdens of new development projects. However, recognizing that the costs burdens are already high, any future increases in the fee, beyond the levels shown in this report, could negatively impact the feasibility of new development projects.

Over the last five years, increasing land values, as shown in Figure 13, have resulted in the need to increase the fee level. Land values increased over 11 percent from 1998 to 1999. From 2000 to 2001, land values increased over 28 percent.

As a result of the Settlement Agreement entered into by the City of Sacramento in 2001, land prices have spiked to \$11,000 per acre. This has occurred due to the requirement that the City purchase habitat lands in specified areas within the Basin. This limit (restriction) on the supply of land suitable for habitat has increased the price of land, since demand has remained unchanged. It is anticipated that adoption of the revised NBHCP and elimination of the Settlement Agreement requirements specifying the location of habitat land acquisition, the cost per acre of habitat land will recede.

Nevertheless, there is anticipated to be on-going pricing pressure on habitat land as the potential supply of habitat land is reduced. Figure 14 shows the distribution of the



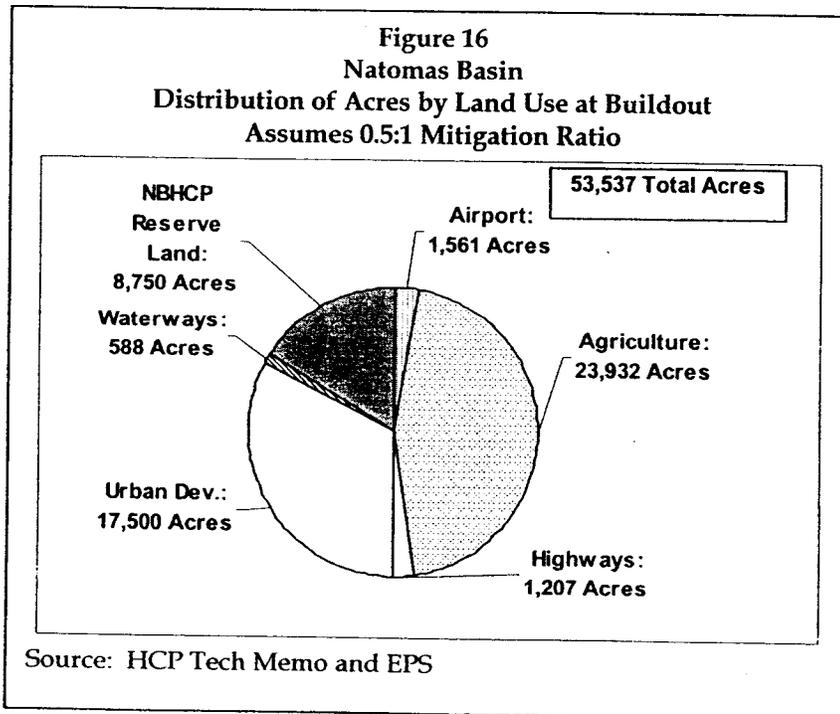
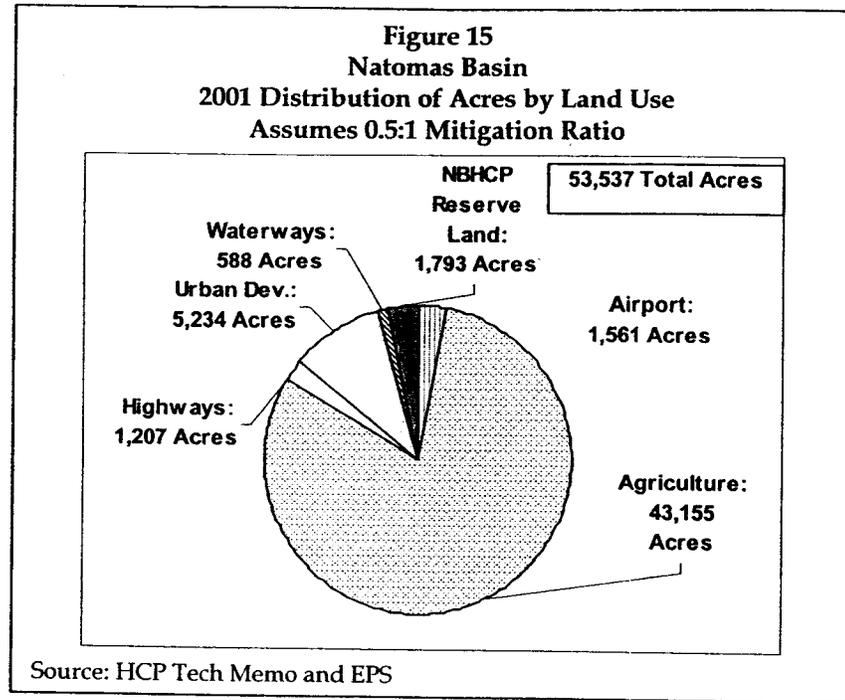
approximately 53,500 acres in the basin among various land uses in 1997. In 1997, there were approximately 45,800 acres of agricultural land out of 53,500 acres total in the Natomas Basin.

In 2001, as shown in Figure 15, there were approximately 2,700 fewer agricultural acres. As urban development

continues to occur, the pool of available agricultural land that can be purchased for habitat land decreases. As evidenced by the phenomenon occurring with implementation of the Settlement Agreement, this will undoubtedly drive the land acquisition costs up over time, and consequently the NBHCP Fee will need to increase over time to generate sufficient revenues for land acquisition.

Figure 16 shows the likely distribution of

acres in the Natomas Basin at buildout. Agricultural land, excluding habitat land, will have diminished to approximately 23,932 acres.



Each of the pie charts shown in **Figure 14** through **Figure 16** are based on a mitigation ratio of one-half acre of habitat mitigation to one acre of development. Scenario 4 presented in this Report contemplates a mitigation ratio of one acre of habitat mitigation to one acre of development.

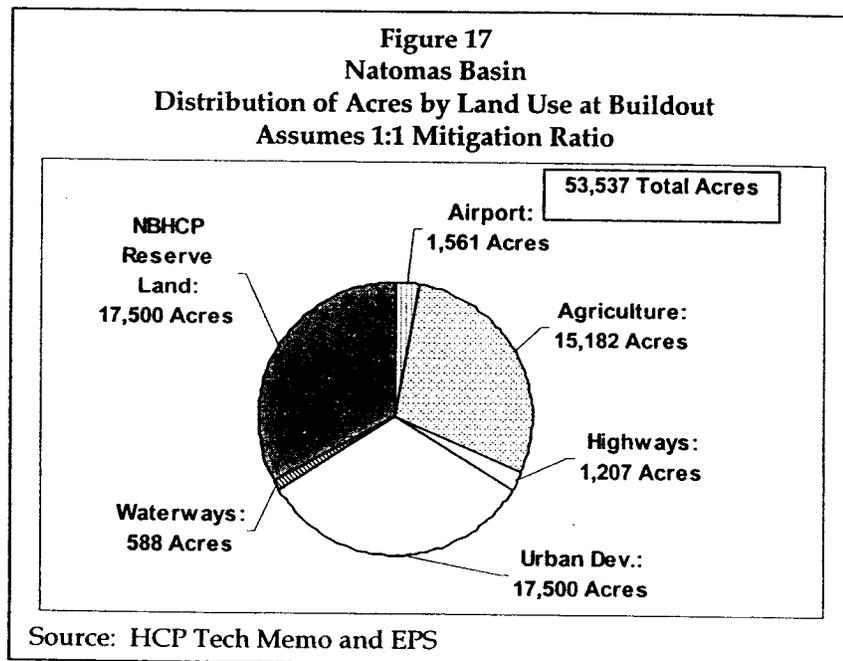
Figure 17 presents a pie chart of the distribution of land uses at buildout assuming a 1:1 habitat mitigation ratio. In this scenario, the habitat mitigation acres at buildout total 17,500 acres. The remaining agricultural acres are reduced from 23,932 acres (as shown in **Figure 16**) to 15,182 acres, representing a 37 percent decline in total remaining agricultural acres.

Figure 18 shows the historical trend in land costs as well as three alternative projected trends in land costs through 2005 - increasing at 5%, 10%, and 20% annually. The historical annual average increase has been approximately 11%. By 2005, the land costs could range between \$5,800 to \$7,600 per acre excluding transaction costs and contingencies.

Transaction and contingency costs are estimated to be approximately 20% of the land value. This would push the total acquisition costs between approximately \$7,000 and \$9,100 per acre.

Land cost increases would be even greater under Scenario 4 (1:1 habitat mitigation ratio) due to the

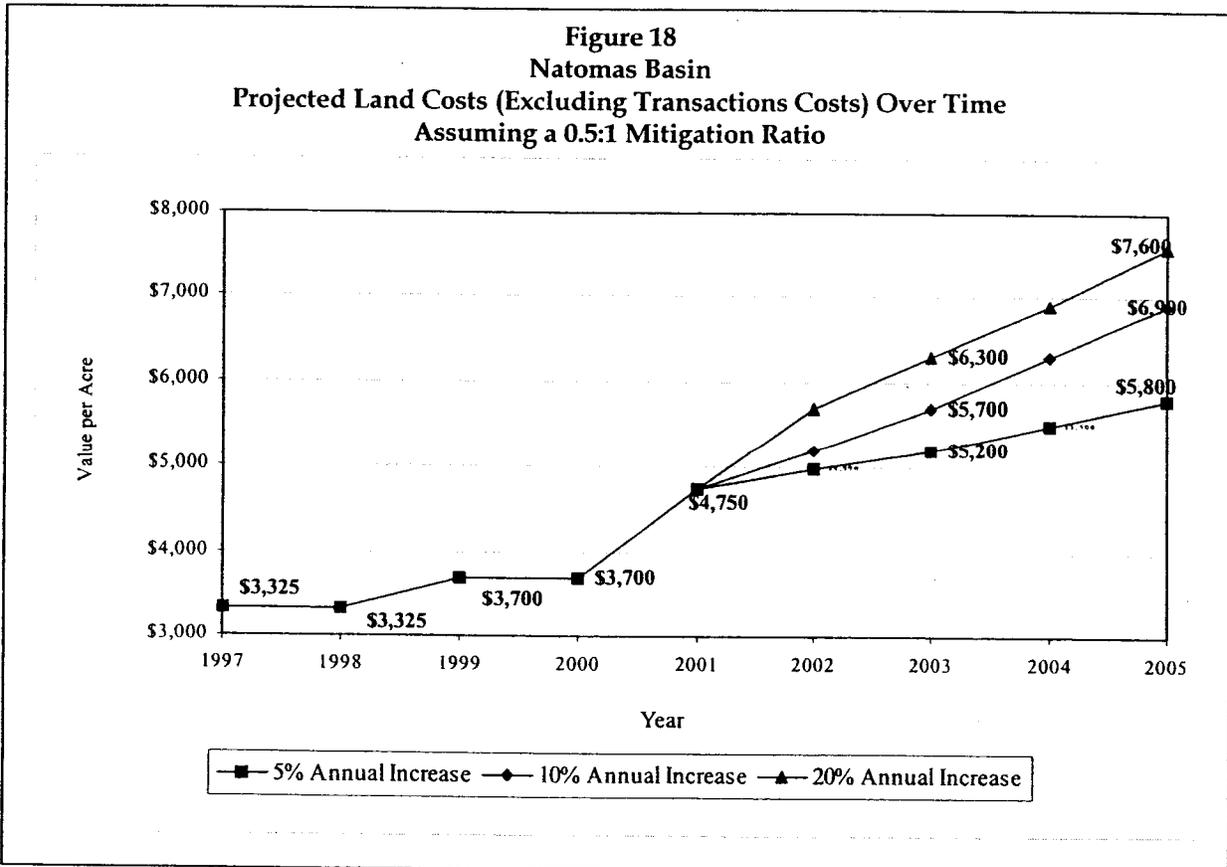
greater demand for habitat acres with a fixed supply of potential habitat land. While it is not possible to predict the actual land costs under such a scenario, it would most likely negatively impact the financial feasibility of the projects in the Natomas Basin. The fee estimated under Scenario 4 is \$10,486, nearly double the fee estimated for the base case of \$5,993 per acre - both of which assume the same land acquisition cost per acre. With the increased demand for habitat land under Scenario 4 and a static supply of acres from which to buy habitat land, the impact, over time, will be a significant increase in the land acquisition prices. This will require even greater fee increases potentially pushing the development projects out of the realm of feasibility.



While the economic analysis and financial modeling in this analysis did not model the 3:1 mitigation requirement included in the EIR Alternative 2, it can reasonably be assumed that the impact on land prices would be similar, if not greater, than under the 1:1 mitigation alternative. By inference, therefore, such an alternative would also negatively impact the feasibility of development projects in the Natomas Basin over time.

Similarly, the impact of a mitigation requirement to purchase habitat land in specified areas, as described in EIR Alternative 3 (also not modeled as part of this analysis) would result in increased land acquisition costs, as evidenced by the most recent NBC land acquisition costs of \$11,000 an acre under the Settlement Agreement. While this is believed to be a temporary increase in land acquisition costs, past practice indicates requiring specific reserve areas as part of the HCP would increase the land costs on an on-going basis and negatively impact the financial feasibility of development projects.

In general, as land costs continue to increase and the NBHCP fee increases as a result, the financial feasibility of the development projects within the Natomas Basin area are likely to diminish over time as well.



VI. OVERVIEW OF FINANCIAL MODEL

This Chapter provides an overview of the financial model of the NBHCP. This discussion focuses on the general cash flow model assumptions and provides a detailed description of the model using the Base Case scenario.

IMPORTANT CONSIDERATIONS

Before describing the cash flow model and financial analysis in detail, there are several factors that should be noted and kept in mind when considering the financial analysis. They are as follows:

- **Interaction of Funds:** Although the fee is based on the sum of several cost components, the portion of the fee funding the NBC annual costs may be used for any of the NBC annual activities given the priorities established by the NBHCP. Only the fee components for the O&M Endowment Fund and the 2 percent administrative fee are to be used entirely and exclusively for their respective purposes. In other words, the financing mechanism as established provides the ability to transfer monies between the Land Acquisition fund, the Restoration & Enhancement Fund, and the O&M/ Administration fund.
- **Viability Under Specific Set of Conditions:** The economic analysis and cash flow modeling incorporate the major provisions of the NBHCP into a working model to indicate whether the Plan is financially viable under a specific set of conditions. It is not intended to depict how the NBHCP will necessarily be implemented on an annual basis.
- **Mitigation Fee Reviewed and Adjusted Annually:** The financial analysis assumes that costs, such as land acquisition costs, are constant through the 50-year permit period, for purposes of the cash flow modeling. In actuality costs will fluctuate over time in response to market conditions and other factors. The fee program is monitored and can be adjusted on an annual basis to adapt to changes in cost assumptions and revenue projections.

CASH FLOW MODEL ASSUMPTIONS

The cash flow model is based on a series of assumptions regarding expenditures and revenues for the HCP. The majority of these assumptions are presented in Figure 19 through Figure 21.

Figure 19 shows the assumptions regarding land acquisition values per acre, the projected use of In-Basin lands, and the use of rice lands. The land acquisition values are based on the recent experience of the NBC in their acquisition of land to date. Land values within the Basin are likely to be higher than out of Basin because there is greater

land availability out of Basin and less development pressure. The HCP allowed for up to 20 percent of mitigation land to be purchased out of Basin. However, the financial analysis assumes that no land is purchased out of Basin, and therefore the land acquisition value assumed in the analysis may actually be higher, or reflect a more conservative assumption, than may prevail in implementation of the HCP. Transaction and contingency costs are added to the land acquisition value for a total land acquisition cost of \$6,000 per acre.

The assumptions regarding the use of mitigation lands are based on the program as outlined in the HCP. **Figure 22** shows the distribution of mitigation land based on use for the Base Case scenario over the 50-year period of the ITPs and HCP.

Figure 19 also includes the assumptions regarding the average cost per acre of restoring and enhancing mitigation land. The only cost assumed with restoration and enhancement is in relation to the conversion of agricultural (predominantly rice) land to managed marsh. The cost per acre is estimated to be \$2,919, based on the "Site-Specific Management Plans for the Natomas Basin Conservancy's Mitigation Lands for Sacramento and Sutter Counties" prepared by Wildlands, Inc. in June of 2000. The cost per acre of the conversion of marsh land, assumed to be 25 percent of total mitigation lands, is averaged over all of the mitigation lands acquired to determine a weighted average cost per acre of \$621.

An average cost per acre of \$116 is included to provide for the costs of conducting the site-specific plans for the mitigation lands. The total average cost per acre for restoration and enhancement is estimated to be \$736 per habitat acre. (Note: this cost per habitat acre changes if the assumed percent of marsh land converted is changed.)

Figure 20 and **Figure 21** provide the expenditure and revenue assumptions for the ongoing O&M and administrative costs of the NBHCP. The O&M costs are based on estimates provided in the June 2000 Site-Specific Plan prepared by Wildlands, Inc. The property tax assumptions are based on the property tax bills for existing mitigation lands.

The administrative costs are based on the budget of the NBC. A breakdown of these costs is shown in **Figure 21**.

O&M revenues are assumed from rice or crop land farming leases and hunting of water fowl. The revenue assumed per acre for these activities is shown in **Figure 19**.

Figure 19
Natomas Basin HCP
Land Acquisition and Restoration/Enhancements Cost
and Acquired Habitat Land Utilization Assumptions

Base Case 17,500 acres of development 1/2 acre of mitigation land per gross acre of developed land 25% marsh
--

Part A - Assumptions				Notes:
Inflation	0.0%			
Interest Rate	3.0%			
Land Acquisition Values per Acre	<u>Land Value</u>	<u>Permitted by Plan</u>	<u>Assumed in Financial Analysis</u>	
In-Basin Lands	\$4,750	80%	100%	Estimated \$4,500-\$5,500 per acre range Estimated \$2,500-\$3,500 per acre range per Recent Experience of NBHCP
Out-of-Basin Lands	\$3,000	20%	0%	
Average Land Value (1)	\$4,750 Use In-Basin Land Value			
Plus Transaction Costs & Contingency	\$1,250 per Acre			
Average Land Acquisition Cost	\$6,000 per acquired acre			Beginning 1/1/01
Estimated Use of In-Basin Lands				
Marsh	25%			
Existing Rice	50%			
Other/Upland	25%			
Total Initial Use	100%			
Rice Converted to Marsh	After year 5, 324 acres in marsh 25% thereafter			
Rice Lands				
Uplands/Fallow	10%			
Leased for Other Crops	0%			
Leased Rice Base Land	90%			
Total Rice Lands	100%			
Initial Restoration/Enhancement	<u>Use of Land</u>	<u>Initial Costs</u>	<u>Weighted Cost (5)</u>	
Expended At Time Land Is Acquired				
Marsh (2)	0%	\$0	\$0	Note (3)
Existing Rice	75%	\$0	\$0	Note (3)
Dry Converted to Rice	0%	\$0	\$0	Note (3)
Other Upland	25%	\$0	\$0	Note (3)
Subtotal	100%		\$0	
Expended At Time Land Is Converted				
Rice/Other Converted to Marsh	25%	\$2,482	\$621	Note (4)
Site Specific Plan Costs			\$116 per acre	Based on initial Site Specific Plan for 1,297 acres
Average Cost per Habitat Acre			\$736	Weighted average cost per acre

assumptions1

Source: Natomas Basin Conservancy

- (1) Assumes all acquisition occurs at the average in-basin land value.
- (2) Initial use of marsh land estimated at 0% because NBHCP estimates that little to no marshland is available for acquisition. However, rice land will be converted to marsh land.
- (3) The initial costs of marsh, existing rice, dry land converted to rice and other upland have been set to zero as no initial restoration or enhancement costs are anticipated.
- (4) The current estimate of \$2,482 per acre is calculated from the May 2001 cost estimate of \$2.13 million for 858 acres and is based on creation/maintenance of habitat for the giant garter snake and the Swainson's hawk.
- (5) The cost of restoration and enhancement is weighted by the percent of acres assumed to be converted or used for that particular land use.

Figure 20
Natomas Basin HCP
Operations & Maintenance Assumptions

<p>Base Case 17,500 acres of development 1/2 acre of mitigation land per gross acre of developed land 25% marsh</p>

Part A - Assumptions Con't		Notes:	
Operations & Maintenance Costs			
Marsh	\$281 per acre	Updated Cost -- May 2001 Based on Wildlands, Inc. Estimates Based on Wildlands, Inc. Estimates alfalfa, safflower, etc.	
Upland/Fallow	\$18 per acre		
Land Leased for Planted Rice Base	\$3 per acre		
Land Leased for Other Crops	\$3 per acre		
Other	\$0 per acre		
Hunting	\$0 per acre		
Misc./Monitoring/Adaptive Mgmt.	\$27 per acre	Updated Cost -- May 2001 Based on Wildlands, Inc. Estimates	
Special Assessment & Property Tax Costs			
<u>Sacramento County</u>			
Reclamation District #1000	\$13.1 per acre	Based on Existing Sacramento County Lands Based on Existing Sacramento County Lands Based on Existing Sacramento County Lands Based on Existing Sacramento County Lands Assumes average assessed value of land at \$2,400 per acre	
NCMWA	\$0.4 per acre		
SAFCA O&M Assessment #1	\$5.7 per acre		
CSAI Safety Lights	\$0.1 per acre		
Property Tax [1]	\$25.6 per acre		
Subtotal Sacramento County	\$45 per acre		
<u>Sutter County</u>			
Reclamation District #1000	\$13.1 per acre		
NCMWC	\$0.4 per acre		
Property Tax	\$24.0 per acre		
Subtotal Sutter County	\$37 per acre		
Administrative Costs			
During Development	\$447,695 per year	Figure 5 for detail phased in over 3- 5 years	
After All Land Acquired	\$380,541 per year		
Operations & Maintenance Revenues			
Crop Land Leases			
<u>Through 2002</u>			
Planted Rice Base Acreage	\$160 per acre/year	normal ag. practices	\$135 - \$210 range
Other Crops (Flex. acreage)	\$80 per acre/year	normal ag. practices	\$75 - \$100 range
<u>2003 +</u>			
Planted Rice Base Acreage	\$160 per acre/year	normal ag. practices	\$135 - \$210 range
Other Crops (Flex. acreage)	\$80 per acre/year	normal ag. practices	\$75 - \$100 range
Hunting			
Hunting Revenue per Acre	\$12 per acre		Based on Wildlands Estimate for initial Site Plan

Source: Natomas Basin Conservancy

"assumptions2"

[1 Includes G.O. bond assessment.

Figure 21
Natomas Basin HCP
Estimated Annual Natomas Basin Conservancy (NBC) Administrative Costs

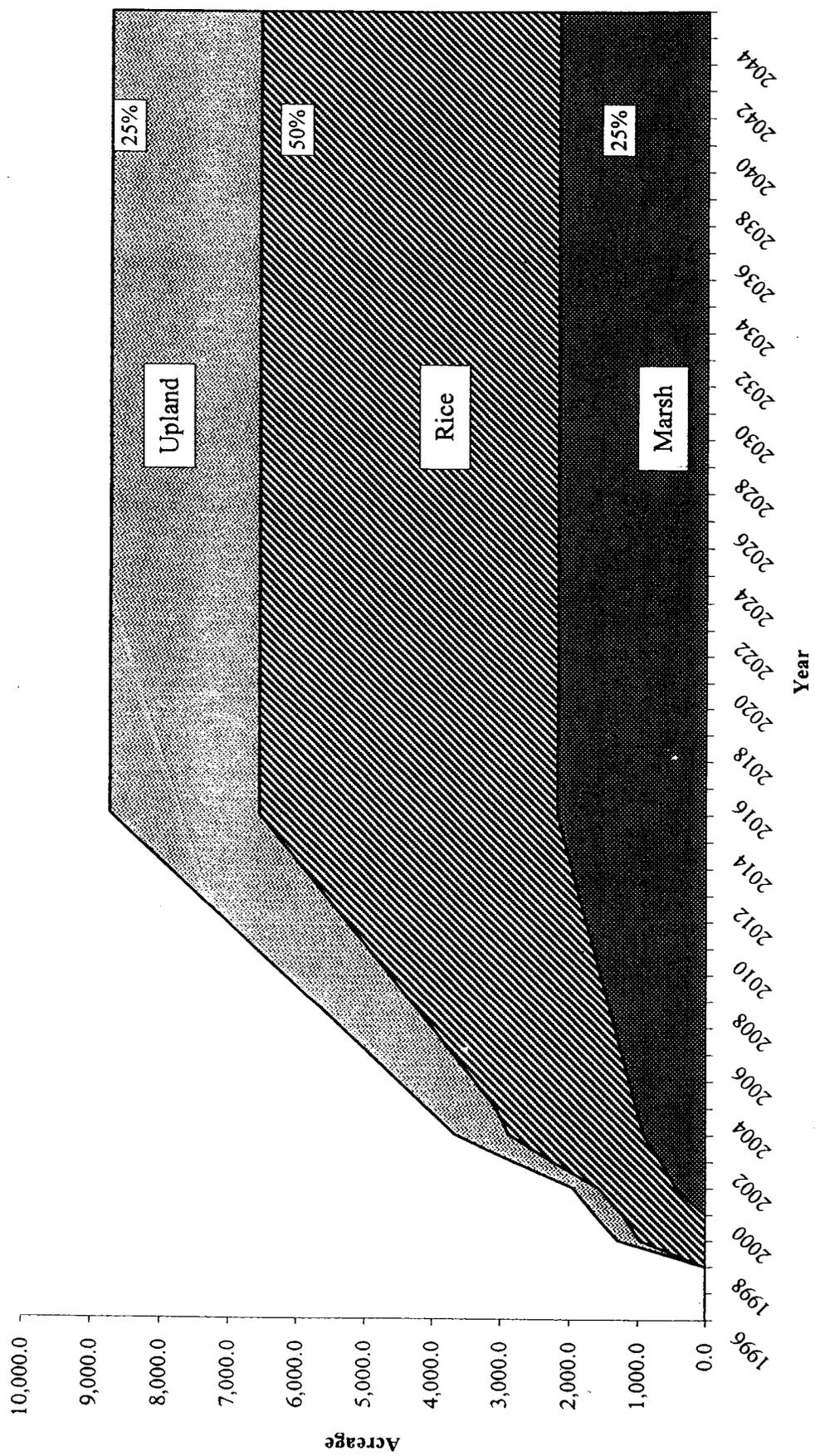
	Annual Cost	Notes
<u>Administrative Expenses</u>		
Staff	\$150,000	
Benefits	\$49,500	
Board Expense	\$6,000	
Subtotal	\$205,500	
<u>Office Expense</u>		
Rent	\$15,000	
Telephone	\$1,700	
Copying & Printing	\$16,000	
Office Supplies	\$5,000	
Postage	\$600	
Equipment	\$2,500	
Auto Expense	\$6,500	
Subtotal	\$47,300	
<u>Miscellaneous Expense</u>		
Insurance	\$23,000	Liability and E&O
Accounting	\$16,500	
Legal	\$60,000	
Corporate Taxes	\$1,000	
Subtotal	\$100,500	
Contract Work/ Public Education/ Publications/Monitoring/Reports, etc.	\$36,000	
Subtotal Costs	\$389,300	
Contingency	\$58,395	15% Contingency
Total Administration During Habitat Acquisition Phase	\$447,695	
Total Administration After Habitat Acquisition	\$380,541	[1]

"admin"

Source: NBC FY 2001 budget estimate

[1] Administrative costs are reduced by 15% after all habitat lands have been acquired per John Roberts.

Figure 22
Natomas Basin HCP
Summary of Habitat Acreage
Base Case



UPDATES TO FINANCIAL ANALYSIS

The financial analysis for the Base Case relies in part on the last financial analysis of the HCP completed in July of 2000. The Base Case also incorporates updates based on the revised HCP and other revisions such that the cash flow modeling more accurately reflects the experience and projected operations of the NBC. These updates include:

- **Rice Revenue Projections:** Rice revenues were modeled to more precisely match current estimates of projected revenue over the next two years.
- **Revised Administrative Cost Estimates:** Administrative costs were revised based on the current budget estimates of the NBHCP.
- **Fund Balance Adjustments:** The cash flow analysis was adjusted such that beginning balances in 2001 match actual fund balances of the NBHCP as of December 31, 2000.
- **Transfer from O&M/Admin to Restoration & Enhancement:** The HCP fee program, since conception, was structured to allow transfers of funds between the Land Acquisition, Restoration & Enhancement, and Administration/O&M funds based on any surpluses or deficits that might exist in those funds. Currently, the O&M/ Administration fund has operating surpluses due to operating and administrative efficiencies of the NBC while the revenues for Restoration & Enhancement need to be supplemented over the next few years due to higher than anticipated restoration and enhancement costs for marsh lands. Not only is the cost to restore and enhance managed marsh significantly higher than the original plan estimated, it is also anticipated that managed marsh restoration and enhancement obligations will be far more intense and concentrated than provided in the original plan due to a more condensed period of development activity. Therefore, a transfer from the O&M/ Administration fund to the Restoration & Enhancement fund was assumed in 2003 and 2004 in the cash flow model.
- **No Reduction in Administrative Costs Post-Land Acquisition:** Previous versions of the financial analysis have assumed that administration costs would be reduced by 67 percent after all mitigation lands have been acquired. Based on discussions with the NBC and information provided by John Roberts, we have come to the conclusion that it is unrealistic to assume a significant decrease in administrative costs once all land acquisition has been completed. Therefore we have assumed a 15 percent reduction in administration costs. The reduction allows for a decrease in legal expenses, but leaves intact funding for most other administrative expenses. This revision to administration costs over the long term represents approximately a 20 percent increase in the Admin./O&M expenditures on an annual basis. However, the Admin./O&M fee is a relatively small component, approximately 16 percent, of the overall fee program including the Settlement Agreement Premium for land acquisition.
- **Acceleration of Fees Paid (Grading Permits Pulled):** Past cash flow model analyses have assumed a 50- year development absorption schedule for the 17,500 acres of planned development in the Natomas Basin. Historical development over the last three years has been substantially greater than anticipated by the original cash flow

analysis. Given recent market trends, it is likely that development activity will continue to be at higher levels than originally projected. Even if the market slows, and as a result development activity also slows, there is a very high probability that developers will pull grading permits even if they do not plan to develop the property in the immediate future in order to avoid future delays in the permitting process due to potential legal challenges to the NBHCP fee. Therefore, the current cash flow analysis assumes a 15-year development period, during which grading permits are projected to be pulled and the NBHCP fees paid. Actual development may substantially lag the grading permit stage.

FINANCIAL MODELING DISCUSSION FOR BASE CASE

The financial model includes a series of cash flows over a 50-year period. The financial analysis has historically included four major funds – Land Acquisition (LA), Restoration/Enhancement (RE), O&M/ Administration, and the O&M Endowment fund. The current financial analysis has included a fifth fund that is the Supplemental Endowment Fund to be used for advanced acquisition of habitat mitigation lands. If the money generated for the Supplemental Endowment fund is not required to purchase land or not all funds are expended, the balance in the fund, at the discretion of the NBC Board of Directors, would be transferred to either the O&M Endowment fund or the O&M/ Administration fund at the end of the land acquisition phase of the HCP.

A summary of the cash flow for each of these funds is shown in **Figure 23** and **Figure 24**. The summary presents the status of the fund in five year intervals on a pro forma basis. A more detailed explanation of each of these cash flows is provided in **Figure 25** through **Figure 29**. The cash flow analysis is presented in nominal dollars as opposed to real dollars (no inflation is assumed in the analysis), which allows for a comparison of the end-term fund balances in today's dollars.

The Base Case assumes the level of development and mitigation ratios historically assumed by the NBHCP. It assumes a total of 17,500 acres of development occur over the next 30 years. The mitigation ratio is 0.5 acres of mitigation for every gross acre of development. Distribution of rice, marsh, and upland/other lands remains consistent with the historical cash flow model. Based on updates to the model as described above, the estimated fee is \$5,993, which is currently the base fee under the settlement agreement.

The land acquisition cost has been increased based on discussions with the NBC (and is consistent across all scenarios). The August 2000 update assumed that combined land acquisition costs, transaction costs, and contingency costs totaled of \$5,000. This amount has been increased to \$6,000 to more accurately reflect current market conditions.

In addition, the Land Acquisition cash flow was adjusted such that the contingency is not deducted as an expense, but is maintained in the revenue portion of the cash flow. As a result, the fund balance is substantial at the end of the fifty-year time horizon

projected by the cash flow analysis. To the extent the contingency revenues are drawn upon, the fund balance surplus will decrease. If at the end of the land acquisition phase of the NBHCP there remains a fund balance surplus, it will be transferred to either the O&M/ Administration fund or the O&M Endowment fund.

Besides the increase in land acquisition costs, the next largest increase in costs relates to O&M/ Administration and the O&M Endowment fund. Because the administrative costs are assumed to go on in perpetuity at a higher level than assumed in past financial analyses, i.e., a 15 percent rather than a 67 percent reduction after all land has been acquired, the fee was increased accordingly.

The O&M Endowment fund fee component was also increased, because it is the O&M Endowment that provides operating revenues to the O&M/ Administration fund after land acquisition. In year 50, the O&M endowment fund provides approximately 32 percent of operating revenues. The remaining revenues are assumed to come from rice and hunting revenues. Figure 30 provides a comparison of funding sources for the O&M/ Administration fund over the 50-year period.

Figure 23

**Natomas Basin HCP
Cash Flow Summary**

*Land Acquisition, Supplemental Endowment, and
Restoration and Enhancement Funds*

Base Case

17,500 acres of development

1/2 acre of mitigation land per gross acre of developed land

25% marsh

Assumes: 0.0% Inflation
3.0% Interest Rate

	Total 1995-2045	0 1995	1 1996	5 2000	10 2005	20 2015	30 2025	40 2035	50 2045
LAND ACQUISITION									
Beginning Balance		\$0	\$0	\$587,176	\$1,902,545	\$6,382,454	\$7,009,270	\$7,009,270	\$7,009,270
Less Land Costs	(\$43,320,901)	\$0	\$0	(\$1,614,279)	(\$2,182,526)	(\$2,182,526)	\$0	\$0	\$0
Plus LA Fee Revenue	\$48,453,077	\$0	\$55,641	\$1,220,119	\$2,534,546	\$2,534,546	\$0	\$0	\$0
Plus Interest Earnings	\$1,574,349	\$0	\$0	\$67,352	\$66,556	\$133,755	\$0	\$0	\$0
Plus Transfer from O&M	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Plus Drawdown on Supp. Endowment Fund	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Plus Adjustment (to balance to 2000 end bal)	\$302,745	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Ending Balance	\$7,009,270	\$0	\$55,641	\$260,368	\$2,321,121	\$6,868,229	\$7,009,270	\$7,009,270	\$7,009,270
SUPPLEMENTAL ENDOWMENT									
Beginning Balance	\$0	\$0	\$0	\$0	\$722,767	\$2,424,124	\$3,423,171	\$4,600,455	\$6,182,627
Less Drawdown on Supp. Endowment Fund	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Plus Supplemental Endowment Fee Revenue	\$2,088,119	\$0	\$0	\$0	\$126,727	\$126,727	\$0	\$0	\$0
Plus Interest Earnings	\$4,279,986	\$0	\$0	\$0	\$21,683	\$72,724	\$102,695	\$138,014	\$185,479
Ending Balance	\$6,368,106	\$0	\$0	\$0	\$871,177	\$2,623,575	\$3,525,866	\$4,738,469	\$6,368,106
RESTORATION & ENHANCEMENTS									
Beginning Balance		\$0	\$0	\$589,200	\$1,100,820	\$766,024	\$127,745	\$127,745	\$127,745
Less Restoration/Enh. Costs	(\$6,441,343)	\$0	\$0	\$0	(\$751,710)	(\$310,968)	\$0	\$0	\$0
Plus R&E Fee Revenue	\$5,839,422	\$0	\$0	\$132,951	\$310,968	\$310,968	\$0	\$0	\$0
Plus Transfer from O&M/Admin. Fund	\$600,000	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Plus Interest Earnings	\$282,132	\$0	\$0	\$12,373	\$23,117	\$16,087	\$0	\$0	\$0
Plus adjustment (to balance to 2000 end bal)	(\$152,466)	\$0	\$0	(\$152,466)	\$0	\$0	\$0	\$0	\$0
Ending Balance	\$127,745	\$0	\$0	\$582,058	\$683,196	\$782,111	\$127,745	\$127,745	\$127,745

cash_flow_sum1

Figure 24

**Natomas Basin HCP
Cash Flow Summary**

*Administration/Operations & Maintenance Fund,
Endowment Fund, and Ending Balances Summary for All Funds*

Base Case

17,500 acres of development
1/2 acre of mitigation land per gross acre of developed land
25% marsh

Assumes: 0.0% Inflation
3.0% Interest Rate

	Total 1995-2045	0 1995	1 1996	5 2000	10 2005	20 2015	30 2025	40 2035	50 2045
ADMINISTRATION / OPERATIONS & MAINTENANCE									
Beginning Balance		\$0	\$0	\$1,203,378	\$5,823,281	\$13,734,117	\$10,632,160	\$4,836,878	\$0
Less O & M Costs	(\$64,768,078)	\$0	\$0	(\$502,829)	(\$1,084,975)	(\$1,584,646)	(\$1,517,492)	(\$1,517,492)	(\$1,517,492)
Plus Admin/O&M Fee Revenue	\$23,568,011	\$0	\$4,561	\$475,466	\$1,313,740	\$1,313,740	\$0	\$0	\$0
Plus Rice Revenues	\$25,436,070	\$0	\$0	\$176,148	\$325,856	\$630,002	\$630,002	\$630,002	\$630,002
Plus Hunting Revenues	\$2,410,524	\$0	\$0	\$0	\$20,366	\$63,000	\$63,000	\$63,000	\$63,000
Plus Other Revenues (1)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Plus Interest Earnings	\$10,125,364	\$0	\$0	\$36,101	\$174,698	\$412,024	\$318,965	\$145,106	\$0
Subtotal Revenues	\$61,539,968	\$0	\$4,561	\$687,715	\$1,834,660	\$2,418,765	\$1,011,967	\$838,108	\$693,002
Less Transfer to RE Fund	(\$600,000)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Less Transfer to Land Acquisition Fund	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Plus Adjustment (to balance to 2000 end bal)	\$161,275	\$0	\$0	\$161,275	\$0	\$0	\$0	\$0	\$0
Drawdown on Endowment Fund	\$3,666,835	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$824,490
Subtotal of Fund Transfers & Adjustment	\$3,228,110	\$0	\$0	\$161,275	\$0	\$0	\$0	\$0	\$824,490
Ending Balance	\$0	\$0	\$4,561	\$1,549,539	\$6,572,966	\$14,568,236	\$10,126,635	\$4,157,495	\$0
ENDOWMENT									
Beginning Balance	\$0	\$0	\$0	\$323,846	\$4,393,039	\$13,728,746	\$19,445,653	\$26,301,336	\$32,643,989
Less Drawdown on Endowment Fund	(\$3,666,835)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	(\$824,490)
Plus Endowment Fee Revenue	\$11,554,990	\$0	\$3,041	\$113,645	\$675,879	\$675,879	\$0	\$0	\$0
Plus Interest Earnings	\$24,923,590	\$0	\$0	\$26,490	\$137,415	\$420,188	\$595,693	\$807,282	\$1,006,322
Plus Adjustment (to balance to 1999 end bal)	\$14,076	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Ending Balance	\$32,825,821	\$0	\$3,041	\$463,981	\$5,206,333	\$14,824,812	\$20,041,346	\$27,108,618	\$32,825,821
SUMMARY OF FUND ENDING BALANCES									
Land Acquisition	\$7,009,270	\$0	\$55,641	\$260,368	\$2,321,121	\$6,868,229	\$7,009,270	\$7,009,270	\$7,009,270
Supplemental Endowment	\$6,368,106	\$0	\$0	\$0	\$871,177	\$2,623,575	\$3,525,866	\$4,738,469	\$6,368,106
Restorations and Enhancements	\$127,745	\$0	\$0	\$582,058	\$683,196	\$782,111	\$127,745	\$127,745	\$127,745
Operations and Maintenance	\$0	\$0	\$4,561	\$1,549,539	\$6,572,966	\$14,568,236	\$10,126,635	\$4,157,495	\$0
Endowment	\$32,825,821	\$0	\$3,041	\$463,981	\$5,206,333	\$14,824,812	\$20,041,346	\$27,108,618	\$32,825,821
COMBINED FUNDS ENDING BALANCE	\$46,330,942	\$0	\$63,242	\$2,855,946	\$15,654,793	\$39,666,963	\$40,830,862	\$43,141,597	\$46,330,942

(1) "Other" revenues represents upfront funding from Federal, State or development fees to fund the initial acquisition and restoration/enhancement costs.

Figure 25
Natomas Basin HCP
Land Acquisition Cash Flow Summary

Base Case 17,500 acres of development
 1/2 acre of mitigation land per gross acre of developed land
 25% marsh

Assumes: 0.0% Inflation
 3.0% Interest Rate

	Total 1994-2045	0 1995	1 1996	5 2000	10 2005	20 2015	30 2025	40 2035	50 2045
LAND ACQUISITION									
Beginning Balance		\$0	\$0	\$587,176	\$1,902,545	\$6,382,454	\$7,009,270	\$7,009,270	\$7,009,270
Less Land Costs	(\$43,320,901)	\$0	\$0	(\$1,614,279)	(\$2,182,526)	(\$2,182,526)	\$0	\$0	\$0
Plus LA Fee Revenue	\$48,453,077	\$0	\$55,641	\$1,220,119	\$2,534,546	\$2,534,546	\$0	\$0	\$0
Plus Interest Earnings	\$1,574,349	\$0	\$0	\$67,352	\$66,556	\$133,755	\$0	\$0	\$0
Plus Transfer from O&M	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Plus Drawdown on Supp. Endowment Fund	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Plus Adjustment (to balance to 2000 end bal)	\$302,745	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Ending Balance (2)	\$7,009,270	\$0	\$55,641	\$260,368	\$2,321,121	\$6,866,229	\$7,009,270	\$7,009,270	\$7,009,270

The Land Acquisition Cash Flow Summary provides a snapshot of the status of the fund at the end of multi-year periods. The detailed, year-by-year cash flow analysis is provided in the Appendix.

- **Beginning Balance:** Funds available at the start of the year.
- **Land Costs:** Represents money spent to buy land that year. Land costs are estimated based on the experience of the Natomas Basin Conservancy. Land acquisition costs are assumed to \$4,750 per acre. Transaction costs and contingency costs are assumed to be \$1,250 per acre. However the contingency costs are not charged in the cash flow analysis which results in a surplus. If land prices are higher than anticipated, the contingency would be drawdown, and the fee would be adjusted upward the following year to reflect current
- **Land Acquisition Fee Revenue:** Represents the fees collected to cover land acquisition, transaction costs, and contingencies. Based on the mitigation ratio of 0.5 to 1.0, the fee revenue collected per acre is half that of the land cost.
- **Interest Earnings:** Interest earned on the prior year's fund balance. An interest rate of 3% is assumed to be earned on 50% of the prior year's fund balance. No inflation is assumed, therefore the 3 percent interest is intended to reflect a real increase in interest earnings. Once land acquisition is completed, interest is no longer assumed to be earned.
- **Drawdown on Supplement Endowment Fund:** Represents a transfer of funds from the Supplemental Endowment Fund to the Land Acquisition Fund. No drawdown is assumed in this analysis. It is the intent of the Supplemental Endowment Fund to allow for advance purchase of mitigation lands or to pay for higher than anticipated land costs.
- **2000 Fund Balance Adjustment:** Represents a one-time fund balance adjustment in 2000 so that the ending year fund balance matches the actual fund balance for the Land Acquisition fund as of Dec. 31, 2000.
- **Ending Balance:** Represents funds available at the end of the year. The overall ending balance projected in this cash flow is positive, largely because the contingency revenues are reserved. To the extent that the contingency revenue is drawdown, the ending balance would be less. Any positive fund balance remaining after all mitigation lands had been purchased would be transferred to the O&M/Administration Fund or the O&M Endowment Fund.

Figure 26
Natomas Basin HCP
Supplemental Endowment Cash Flow Summary

Base Case 17,500 acres of development
 1/2 acre of mitigation land per gross acre of developed land
 25% marsh

	Total 1994-2045	0 1995	1 1996	5 2000	10 2005	20 2015	30 2025	40 2035	50 2045
SUPPLEMENTAL ENDOWMENT									
Beginning Balance	\$0	\$0	\$0	\$0	\$722,767	\$2,424,124	\$3,423,171	\$4,600,455	\$6,182,627
Less Drawdown on Supp. Endowment Fund	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Plus Supplemental Endowment Fee Revenue	\$2,088,119	\$0	\$0	\$0	\$126,727	\$126,727	\$0	\$0	\$0
Plus Interest Earnings	\$4,279,986	\$0	\$0	\$0	\$21,683	\$72,724	\$102,695	\$138,014	\$185,479
Ending Balance (2)	\$6,368,106	\$0	\$0	\$0	\$871,177	\$2,623,575	\$3,525,866	\$4,738,469	\$6,368,106

Assumes: 0.0% Inflation
 3.0% Interest Rate

The Supplemental Endowment Cash Flow Summary provides a snapshot of the status of the fund at the end of multi-year periods. The detailed, year-by-year cash flow analysis is provided in the Appendix.

- **Beginning Balance:** Funds available at the start of the year.
- **Drawdown on Supplemental Endowment:** Represents money transferred from the Supplemental Endowment fund to the Land Acquisition Fund. No drawdown is assumed in the analysis and therefore reflects the contingency available to purchase mitigation land in advance or provide a cushion in the event that land prices are higher than anticipated.
- **Supplemental Endowment Fee Revenue:** Represents the fees collected to allow for advance purchase of mitigation land.
- **Interest Earnings:** Interest earned on the prior year's fund balance. An interest rate of 3% is assumed to be earned on 100% of the prior year's fund balance.
- **Ending Balance:** Represents funds available at the end of the year.

Figure 27
Natomas Basin HCP
Restoration & Enhancement Cash Flow Summary

Base Case 17,500 acres of development
 1/2 acre of mitigation land per gross acre of developed land
 25% marsh

	Total 1994-2045	0 1995	1 1996	5 2000	10 2005	20 2015	30 2025	40 2035	50 2045
RESTORATION & ENHANCEMENTS									
Beginning Balance		\$0	\$0	\$589,200	\$1,100,820	\$766,024	\$127,745	\$127,745	\$127,745
Less Restoration/Enh. Costs	(\$6,441,343)	\$0	\$0	\$0	(\$751,710)	(\$310,968)	\$0	\$0	\$0
Plus R&E Fee Revenue	\$5,839,422	\$0	\$0	\$132,951	\$310,968	\$310,968	\$0	\$0	\$0
Plus Transfer from O&M/Admin. Fund	\$600,000	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Plus Interest Earnings	\$282,132	\$0	\$0	\$12,373	\$23,117	\$16,087	\$0	\$0	\$0
Plus adjustment (to balance to 2000 end bal)	(\$152,466)	\$0	\$0	(\$152,466)	\$0	\$0	\$0	\$0	\$0
Ending Balance	\$127,745	\$0	\$0	\$582,058	\$683,196	\$782,111	\$127,745	\$127,745	\$127,745

Assumes: 0.0% Inflation
 3.0% Interest Rate

The Restoration & Enhancement Cash Flow Summary provides a snapshot of the status of the fund at the end of multi-year periods. The detailed, year-by-year cash flow analysis is provided in the Appendix.

- **Beginning Balance:** Funds available at the start of the year.
- **Restoration & Enhancement Costs:** Represents money spent to restore or enhance wetlands, i.e., creating marsh land. Restoration & Enhancement per acre cost estimates are based on the cost estimates provided in the Draft Site Specific Management Plan for the current 1,631 acres.
- **Restoration & Enhancement Fee Revenue:** Represents the fees collected to cover restoration and enhancement of mitigation lands. Based on the mitigation ratio of 0.5 to 1.0, the fee revenue collected per acre is half that of the land cost.
- **Interest Earnings:** Interest earned on the prior year's fund balance. An interest rate of 3% is assumed to be earned on 70% of the prior year's fund balance. Once land acquisition is completed, interest is no longer assumed to be earned.
- **2000 Fund Balance Adjustment:** Represents a one-time fund balance adjustment in 2000 so that the ending year fund balance matches the actual fund balance for the Land Acquisition fund as of Dec. 31, 2000.
- **Ending Balance:** Represents funds available at the end of the year.

Figure 26
Natomas Basin HCP
Operations & Maintenance/Administration Cash Flow Summary
Base Case 17,500 acres of development
1/2 acre of mitigation land per gross acre of developed land
25% marsh

	Total 1994-2045	0 1995	1 1996	5 2000	10 2005	20 2015	30 2025	40 2035	50 2045
OPERATIONS & MAINTENANCE									
Beginning Balance		\$0	\$0	\$1,203,378	\$5,823,281	\$13,734,117	\$10,632,160	\$4,836,878	\$0
Less O & M Costs	(\$64,768,078)	\$0	\$0	(\$502,829)	(\$1,084,975)	(\$1,584,646)	(\$1,517,492)	(\$1,517,492)	(\$1,517,492)
Plus Admin/O&M Fee Revenue	\$23,568,011	\$0	\$4,561	\$475,466	\$1,313,740	\$1,313,740	\$0	\$0	\$0
Plus Rice Revenues	\$25,436,070	\$0	\$0	\$176,148	\$325,856	\$630,002	\$630,002	\$630,002	\$630,002
Plus Hunting Revenues	\$2,410,524	\$0	\$0	\$0	\$20,366	\$63,000	\$63,000	\$63,000	\$63,000
Plus Other Revenues (1)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Plus Interest Earnings	\$10,125,364	\$0	\$0	\$36,101	\$174,698	\$412,024	\$318,965	\$145,106	\$0
Subtotal Revenues	\$61,539,968	\$0	\$4,561	\$687,715	\$1,834,660	\$2,418,765	\$1,011,987	\$838,108	\$693,002
Less Transfer to RE Fund	(\$600,000)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Less Transfer to Land Acquisition Fund	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Plus Adjustment (to balance to 2000 end bal)	\$161,275	\$0	\$0	\$161,275	\$0	\$0	\$0	\$0	\$0
Drawdown on Endowment Fund	\$3,666,835	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$824,490
Subtotal of Fund Transfers & Adjustment	\$3,228,110	\$0	\$0	\$161,275	\$0	\$0	\$0	\$0	\$824,490
Ending Balance (2)	\$0	\$0	\$4,561	\$1,549,539	\$6,572,966	\$14,588,236	\$10,126,635	\$4,157,495	\$0

The Operations & Maintenance/Administration Cash Flow Summary provides a snapshot of the status of the fund at the end of multi-year periods. The detailed, year-by-year cash flow analysis is provided in the Appendix.

- **Restoring Balance:** Funds available at the start of the year.
- **O&M/Admin Costs:** Represents the estimated expenditures for the following general categories for that year:
 - Maintenance for rice & other crop land, marsh, hunting, and other lands
 - Property taxes & special district assessments
 - Administration of the Natomas Basin Conservancy
 - Species monitoring
- **O&M/Admin Revenue:** Represents the revenues generated to pay for expenditures. Several revenue sources are assumed:
 - Mitigation fees collected
 - Rice farming lease revenues
 - Hunting revenues
 - Other revenues (none assumed)
- **Interest Earnings:** Interest earned on the prior year's fund balance. An interest rate of 3% is assumed to be earned on 100% of the prior year's fund balance.
- **Drawdown on O&M Endowment Fund:** Represents a transfer of funds from the O&M Endowment Fund to the O&M/Admin. Fund. Drawdowns occur after the acquisition phase of the plan. The endowment revenues supplement revenues earned from rice farming and hunting.
- **2000 Fund Balance Adjustment:** Represents a one-time fund balance adjustment in 2000 so that the ending year fund balance matches the actual fund balance for the Land Acquisition fund as of Dec. 31, 2000.
- **Ending Balance:** Represents funds available at the end of the year. In approximately the last ten years of the 50-year period, annual ending balances go to 0. This means that in each year costs equal revenues. The cash flow is intended to go on in perpetuity and is able to do this by drawing on the O&M Endowment fund.

Figure 29
Natomas Basin HCP
O&M Endowment Cash Flow Summary

Base Case 17,500 acres of development
 1/2 acre of mitigation land per gross acre of developed land
 25% marsh

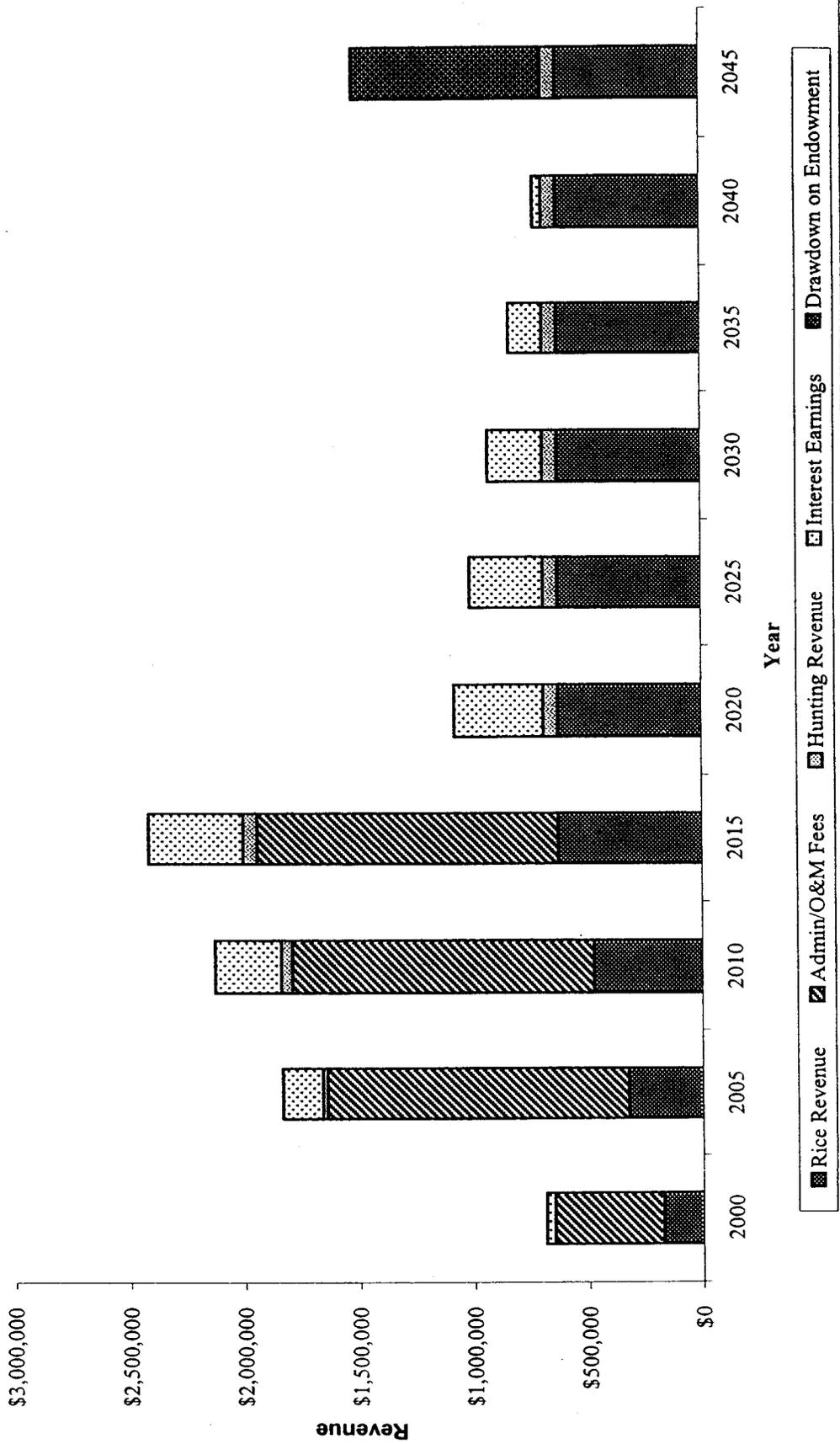
Assumes: 0.0% Inflation
 3.0% Interest Rate

	Total 1994-2045	0 1995	1 1996	5 2000	10 2005	20 2015	30 2025	40 2035	50 2045
SUPPLEMENTAL ENDOWMENT									
Beginning Balance	\$0	\$0	\$0	\$323,846	\$4,393,039	\$13,728,746	\$19,445,653	\$26,301,336	\$32,843,989
Less Drawdown on Endowment Fund	(\$3,666,835)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	(\$824,490)
Plus Endowment Fee Revenue	\$11,554,990	\$0	\$3,041	\$113,645	\$675,879	\$675,879	\$0	\$0	\$0
Plus Interest Earnings	\$24,923,590	\$0	\$0	\$26,490	\$137,415	\$420,188	\$595,693	\$807,282	\$1,006,322
Plus Adjustment (to balance to 1999 end bal)	\$14,076	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Ending Balance (2)	\$32,825,821	\$0	\$3,041	\$483,981	\$5,206,333	\$14,824,812	\$20,041,346	\$27,108,618	\$32,825,821

The O&M Endowment Cash Flow Summary provides a snapshot of the status of the fund at the end of multi-year periods. The detailed, year-by-year cash flow analysis is provided in the Appendix.

- **Beginning Balance:** Funds available at the start of the year.
- **Drawdown on O&M Endowment:** Represents money transferred from the O&M Endowment fund to the O&M/Admin Fund.
- **O&M Endowment Fee Revenue:** Represents the fees collected to fund the O&M Endowment Fund.
- **Interest Earnings:** Interest earned on the prior year's fund balance. An interest rate of 3% is assumed to be earned on 100% of the prior year's fund balance.
- **Ending Balance:** Represents the estimated fund balance at the end of the year.

Figure 30
Natamas Basin HCP
O & M Revenue --Changing Mix of Revenue Sources Over Time
Base Case



DRAFT

ADDENDUM: ECONOMIC ANALYSIS OF THE NBHCP

In March 2002, EPS completed the Final Report of the Economic Analysis of the Natomas Basin Habitat Conservation Plan (NBHCP). In the Report, EPS analyzed two main issues in response to the Judge's ruling on the NBHCP in August of 2000. The two main issues analyzed were:

- Adequate Funding of the NBHCP under a reduced development scenario, and the
- Financial Feasibility or "Practicability" of the NBHCP based on an analysis of five scenarios presented in the Report.

The analysis in the Report focused on five scenarios as follows:

- *Scenario 1 (Base Case)* – 17,500 acres of development, 0.5 to 1 mitigation ratio, 25 percent marsh (per revised NBHCP).
- *Scenario 2* – 12,000 acres of development, 0.5 to 1 mitigation ratio, 25 percent marsh.
- *Scenario 3* – 8,000 acres of development, 0.5 to 1 mitigation ratio, 25 percent marsh.
- *Scenario 4* – 17,500 acres of development, 1 to 1 mitigation ratio, 25 percent marsh.
- *Scenario 5* – 17,500 acres of development, 0.5 to 1 mitigation ratio, 75 percent marsh.

The five scenarios provide a methodology to analyze the range of alternatives included in the NBHCP Draft EIR/EIS. Each scenario was analyzed using a series of cash flows for land acquisition, restoration and enhancement, on-going operation and maintenance including administration of the Natomas Basin Conservancy (NBC), an endowment fund, and a supplemental endowment fund targeted at land acquisition. The cash flows are used to determine the Habitat Mitigation Fee (the "Fee") required to fully fund the NBHCP over the 50-year permit period and beyond. The fees as calculated are summarized in **Figure 1**.

Subsequent to completing the Final Report on the Economic Analysis of the NBHCP, several issues were raised by interested parties and EPS was requested to provide additional analysis or clarification on certain issues. This Addendum to the Report addresses the following issues:

1. Analysis of a “Specific Reserve” Alternative
2. Impact of increased mitigation monitoring and adaptive management requirements
3. Clarification on EPS discussion and findings in regard to the Cost Burden Analysis
4. Clarification on distinction between Administration/O&M Fund and O&M Endowment Fund
5. Clarification on how the calculated Fees are to be interpreted and, perhaps, implemented given uncertainties regarding development in the Natomas Basin

Each of these points is discussed in greater detail below.

SPECIFIC RESERVE ALTERNATIVE

Alternative 3 of the Revised HCP Draft EIR/EIS considers the possibility of identifying specific reserve areas or “reserve zones” that would then be the focus of the acquisition activity of the Natomas Basin Conservancy (NBC). The Economic Analysis prepared by EPS did not analyze this Alternative via the cash flow models as it would require speculation as to the timing and cost of reserve acquisitions.

However, the potential impacts of a specific reserve scenario was discussed qualitatively in the Report on page 37. The law of supply and demand dictates that if supply is restricted, as it would be under a specific reserve alternative, and demand remains unchanged, the result is an increase in price. Land acquisition costs have indeed risen as a result of current restrictions on acquisition of habitat mitigation land due to the Settlement Agreement.

Under the Settlement Agreement the NBC is directed to purchase habitat mitigation land around Fisherman’s Lake. When the Settlement Agreement was entered into in May of 2001, the most current land acquisition transactions adjacent to Fisherman’s Lake was a price per acre of \$11,000 for habitat mitigation land. The fee adopted pursuant to the Settlement Agreement therefore, included land acquisition costs of \$11,000. This represented an increase of \$6,000 per acre for land acquisition above the \$5,000 per acre price (2000 HCP Fee) which was in place prior to adoption of the Settlement Agreement Fee in 2001.

Since adoption of the Settlement Agreement, land acquisition costs, particularly for land in the vicinity of Fisherman’s Lake, have continued to increase. Land owners are currently indicating that they will not sell land for less than \$15,000 per acre. If the fees calculated for Scenarios 1 through 5 were adjusted to account for this higher land acquisition costs, the Fee would need to increase by approximately \$4,500 (excluding any corresponding increase in transaction costs and contingency for land acquisition).

The fees would then range from \$10,493 per acre for the Base Case to \$15,082 per acre for Scenario 5.

The experience of the NBC over the last several years has been that the cost for land acquisition included in the fee becomes the floor for land acquisition prices rather than the ceiling. Therefore, it is likely that if the fee was raised to account for the possibility of land price increases in the future, due to restrictions on where habitat mitigation land could be purchased, land prices throughout the Natomas Basin would see a corresponding increase as well.

Unless new home values and non-residential lease rates continue to increase, the financial feasibility of new development projects are likely to be negatively impacted by significant increases in the NBHCP fee. As discussed in the EPS Report, development projects in the Natomas Basin already have cost burdens that nearly meet or exceed the benchmarks for financial feasibility. The future financial feasibility of development projects in the Natomas Basin will also be affected by the likely increase in development impact fees to be heard by the City of Sacramento City Council in May of 2002 and the most recent increase in the citywide park fee (an increase of approximately \$600 per single family unit).

INCREASED MITIGATION MONITORING AND ADAPTIVE MANAGEMENT

The Economic Analysis of the NBHCP included specific costs assumptions for mitigation monitoring, species monitoring, and adaptive management. These cost assumptions were built into the Administration/O&M fund cash flow analysis. The assumptions, as shown below in Figure 2, remained constant for each of the five scenarios included in the Report.

Figure 2
Estimated Species & Habitat Monitoring Cost Assumptions
Included in EPS March 2002 Report

ITEM	COST ASSUMPTION
Monitoring and Adaptive Management	\$27 per acre per year (\$239,344 per year at buildout)
Reporting/Public Education	\$36,000 per year
Species Monitoring	
Giant Garter Snake	\$45,000 per year
Swainson's Hawk	\$12,000 per year
All Species Inventory	\$12,000 per year
TOTAL AT BUILDOUT	\$344,344 per year

Source: NBC

The revised NBHCP, as currently proposed, would require more extensive mitigation and species monitoring and adaptive management practices. As shown in Figure 3, the costs associated with mitigation monitoring nearly double (as estimated at buildout).

Figure 3
Estimated Species & Habitat Monitoring Cost Assumptions
Based on February 2002 Revised HCP

Item	Recurrence		Annualized Cost
	Cost	Interval (years)	
Conduct annual assessment of habitat conditions	\$60,000	1	\$60,000
Conduct GGS annual field surveys	\$10,000	1	\$10,000
Conduct GGS five-year assessment	\$60,000	5	\$12,000
Conduct Swainson's Hawk survey	\$15,000	1	\$15,000
Conduct all species baseline inventory	\$15,000	43	\$350
Conduct all species five-year inventory	\$120,000	5	\$24,000
Prepare reports	\$25,000	1	\$25,000
Accounting and evaluations	\$25,000	1	\$25,000
TOTAL	\$330,000		\$171,350
Habitat Acres Through 2002			2,089
Annual Cost Per Acre			\$82.02
Total At Buildout (8,750 Acres)			\$716,675

habitat o&m

Source: NBC

The increase in mitigation monitoring costs has a direct impact on the estimated NBHCP. The costs shown above represent annual costs to the NBC and it is estimated that the buildout cost will be reached by 2015. The one-time NBHCP Fee would need to be increased significantly in order to provide sufficient funding for the NBC over the entire 50-year permit period and beyond. As shown in Figure 4, the estimated NBHCP fee would need to be increased by approximately \$1,700 to \$3,200 depending on which Scenario is determined as the basis of the fee.

Figure 4
Comparison of Estimated NBHCP Fee
With and Without Increase in Species & Habitat Mitigation Costs

Scenario	Estimated Fee Prior to Revised Mitigation Monitoring Costs (March 2002)	Estimated Fee After Revised Mitigation Monitoring Costs (April 2002)	Difference
Scenario 1 - Base Case	\$5,993	\$7,722	\$1,729
Scenario 2 - 70% of Plan Implemented	\$6,784	\$8,620	\$1,836
Scenario 3 - 50% of Plan Implemented	\$8,641	\$10,753	\$2,112
Scenario 4 - 1 to 1 Mitigation Ratio	\$10,486	\$13,649	\$3,163
Scenario 5 - 75% Managed Marsh	\$10,582	\$12,449	\$1,867

Source: EPS

COST BURDEN ANALYSIS

One of the tasks EPS was requested to undertake in the Economic Analysis of the NBHCP was to determine whether the mitigation imposed, will to the maximum extent practicable, reduce or mitigate the impacts of development on the protected species. As discussed in the March 2002 Report, the issue of whether the mitigation imposed under Scenarios 1 through 5 mitigates to the Maximum Extent Practicable requires consideration of biological, legal, and financial/economic factors.

EPS addressed only the financial/economic issues in the March 2002 Report. From an economic view point, the question of Maximum Extent Practicable (MEP) was interpreted as one of financial feasibility or practicability. Assuming that the HCP adequately provides for the biological and legal issues, does the fee as proposed “work” from the perspective of providing for financially feasible development. It is not our understanding, that the fee need not push development to the brink of in-feasibility to meet the test of the MEP.

Two tests were applied to Scenarios 1 through 5 to test the financial viability of new development under the mitigation required for each Scenario. The first test was a comparison of the NBHCP fees calculated under Scenarios 1 through 5 with the fees charged by other HCP programs in surrounding jurisdictions. Based on the this analysis it was determined that fees proposed for Scenarios 1 through 5 were considerably higher than similar fees charged by other surrounding jurisdictions for habitat mitigation.

The second test was a cost burden analysis for generic residential, retail, and light industrial development projects in the Natomas Basin and including a comparison to cost burdens for jurisdictions in surrounding areas. The cost burden analysis compares

the total backbone infrastructure costs estimated for the generic project to the estimated sales price of a residential unit or square foot of a retail or light industrial project.

In general, it was found that the infrastructure cost burdens for residential and retail projects in the Natomas Basin were high but not currently out of the range of financial feasibility. For light industrial development, it was found that the financial feasibility will likely depend on what type of product is constructed, e.g., low-end warehousing projects vs. high-end light industrial projects. Given the cost burdens, higher-end light industrial projects will be more feasible, but ultimately the level of demand for these types of projects may result in a slower absorption than if a wider variety of projects were feasible.

The cost burden analysis is a “static” analysis, or, in other words, it reflects the costs and projected product sales prices as of March 2002. To the extent these assumptions change, the results will inevitably change as well.

Whether or not the financial feasibility is impacted will depend on whether home sales price or lease/sales price of non-residential development will change to offset the higher burden. There is less certainty over sales or lease prices keeping pace with cost increases, as it is the market that drives the price at which developers can sell their product. Other development areas in the region, which are not subject to the NBHCP Fee, might be able to deliver their product more inexpensively, depending on supply and demand and other economic factors. If the infrastructure cost burdens continue to increase and there is no off-setting increase in product sales prices, the financial feasibility of development projects in the Natomas Basin will be jeopardized.

The NBHCP Fee has been and will continue to be adjusted annually to account for increases in land prices and other changes in assumptions regarding the NBHCP. To date, the fee increases have not impacted the financial feasibility of the projects in the Natomas Basin because product sales prices of homes and non-residential development have also increased overtime. As long as this trend continues, financial feasibility of development projects in the Natomas Basin will remain intact.

ADMIN/O&M FUND VS. O&M ENDOWMENT FUND

In concept, the Administration/O&M Fund (Admin/O&M Fund) and the O&M Endowment Fund are closely linked, however, they serve very different purposes.

The Admin/O&M Fund serves as the operating cash flow for the NBC. All expenses related to operating, maintaining, and administering the NBHCP are charged to the Admin/O&M Fund. This includes expenses such as species and mitigation monitoring costs, payment of ad valorem taxes, salaries of NBC employees, office rent, legal, reporting costs, etc.

Revenues for operations, maintenance, and administration of the NBC come from three primary sources: annual fee revenues, rice revenues, and hunting revenues. Rice and hunting revenues are projected to continue through the life of the NBHCP. However, fee revenues cease once all allowable grading permits have been pulled in the Natomas Basin (representing development of 17,500 acres).

Rice and hunting revenues are insufficient to cover all of the operating, maintenance, and administration costs of the NBC. Therefore, it was determined at the inception of the financing plan for the NBHCP, that another source of funding would be required in the out years of the Plan. As a result, the O&M Endowment Fund was created. The sole purpose of the O&M Endowment Fund is to provide revenue, in the form of interest earnings on the accumulated principal, to fund the shortfall in revenues for the Admin/O&M Fund in the later years of the Plan (approximately 2032 and beyond). No direct operating expenses are charged to the O&M Endowment Fund.

In running the cash flow model and calculating the NBHCP mitigation fee, EPS always insures that the interest earnings are greater than the drawdown (to the Admin/O&M Fund), so that the shortfall funding will remain available in perpetuity.

IMPLEMENTATION OF THE NBHCP FEE

As mentioned above, the March 2002 Report included five scenarios. Based on comments received by EPS regarding the analysis, it seems necessary to clarify how the Scenarios and corresponding fees should be interpreted in regard to implementing the NBHCP.

Scenario 1 represents the Base Case, which assumes no major change to the parameters of the NBHCP. Projected total development remains at 17,500 acres, the mitigation ratio remains at ½ acre of mitigation land for every gross acre of developed land, and the requirement for managed marsh remains at 25 percent of reserve land acquired by the NBC. Assuming no change to any of these parameters, the Base Fee could be adopted and the financing plan for the NBHCP would not be jeopardized¹.

In Scenario 2 and Scenario 3, the total estimated developed acres was reduced from 17,500 acres to 12,000 acres and 8,000 acres respectively. Under these reduced development scenarios, the estimated fee increases. The fee increases to reflect that under a reduced development scenario, less rice and hunting acres and corresponding revenues will be available. If the reduced development scenarios are a likely future outcome, the higher fee should be adopted at the outset to insure that the financing plan remains viable. The fee as calculated assumes that the fee would be adopted concurrent with the adoption of the revised HCP (in 2002). If the fee were to be adopted in later

¹ In April of 2002 EPS revised the Base Fee for the Natomas Basin Conservancy. The Base Fee increased from \$5,993 in 2001 (and as shown in the March 2002 Report) to \$7,934 per acre of development.

years given a reduced development scenario, the fee would need to be higher than is presently calculated.

Similarly, if the revised HCP calls for either a higher mitigation ratio or an increase in the allocation of managed marsh acres, the higher fee would need to be adopted concurrent with the revised HCP to insure financial viability of the Plan. It should be noted that the Economic Analysis assumed that each of these Scenarios posed a discrete alternative. The fees as calculated assume that no more than one of these parameters is changed with the revised HCP. If, for example, the revised HCP called for a reduced development scenario and adopted a higher mitigation ratio, the fee would need to be recalculated and would likely be much greater than the fees as currently estimated.

Appendix B

Draft “Revised Fee Estimate Based on the Draft (2002) NBHCP”, dated October 11, 2002, prepared by Economic & Planning Systems, Inc.

REVISED FEE ESTIMATE BASED ON DRAFT NBHCP

EPS has updated the cash flow model used to estimate the Natomas Basin Habitat Conservation Plan (NBHCP) mitigation fee (the "fee") based on the Draft NBHCP released July 2002.

The fee was last revised in April 2002, as detailed in Appendix I of the Draft NBHCP dated July 2002. Currently the NBHCP fee is composed of two components – the Base Fee and the Settlement Land Acquisition Premium (the "Settlement Premium") as follows:

	Base Fee	Settlement Premium	Total Fee
Land Acquisition, including Transaction Costs & Contingencies	\$3,750	\$3,947	\$7,697
Restoration & Enhancement	\$782		\$782
O&M/ Administration	\$1,555		\$1,555
O&M Endowment Fund	\$1,500		\$1,500
Supplemental Endowment	\$188		\$188
Fee Collection Administration	\$159	\$81	\$240
Total	\$7,934	\$4,028	\$11,962

The Settlement Premium adopted in 2001 was due to stay in effect only until the expiration of the Settlement Agreement, which was October 1, 2002. As a result, this memorandum details the updated assumptions used to derive only the Base Fee amount.

This memo details the changes to the assumptions used in the cash flow model to calculate the fee. The updated assumptions reflect the best cost estimates at this time of implementing the revised NBHCP. As newer and better cost estimates become available (through operating experience of the TNBC, etc.), the cash flow model and fee calculation will continue to be updated.

The July 2002 Draft NBHCP includes two appendices, Appendix A and Appendix I, containing economic analysis and cost data related to the proposed plan, respectively. Appendix A contains the Economic Analysis of the NBHCP, including an assessment of adequate funding for the NBHCP and a maximum extent practicable analysis. Appendix I provides the NBHCP Fee Update – 2002 (April 25, 2002) which presents cost data regarding the mitigation fee currently in effect in the City of Sacramento under the 1997 NBHCP.

The “Revised Fee Estimate Based on Draft NBHCP” contained in the following fee analysis addresses the costs of implementing the July 2002 Draft NBHCP, including cost estimates associated with TNBC’s obligations under the revised plan, and the mitigation fees necessary to fund the plan. This analysis is not intended to be an update of Economic Analysis in Appendix A nor is it an update to the April 25, 2002 NBHCP Fee Update. Although the following analysis represents an independent estimate of the total costs associated with the implementation of the July 2002 Draft NBHCP, the fee estimates contained in this analysis fall within the range of fees analyzed in the Economic Analysis contained in Appendix A to the NBHCP.

FEE UPDATE

Table 1 presents a summary of the NBHCP fees as well as the fee as currently calculated based on the revised NBHCP. The current fee estimate is \$10,027 per acre and is presented in **Table 2**. In some instances, developers may choose to dedicate land to satisfy the land acquisition portion of the fee. Any land dedication would be subject to the provisions of the NBHCP. In such a case the fee would be \$6,252 as currently calculated.

The fee is calculated based on actual costs and cost assumptions for each fee category listed below:

- Land Acquisition (LA)
- Restoration and Enhancement (RE)
- Administration/Operation & Maintenance (Admin/O&M)
- O&M Endowment
- Supplemental Endowment (for Land Acquisition)

There is a cash flow for each fee category. The fee is determined by ensuring that there are sufficient revenues to meet the required expenditures for each fee category through the NBHCP permit period. In the case of the O&M/Administration and O&M Endowment fund, the cash flow and corresponding fee amounts provide for the required activities, such as land management and monitoring, in perpetuity (forever).

The following details the assumptions used in estimating the fee.

ASSUMPTIONS

GENERAL ASSUMPTIONS

Table 3 presents the general assumptions used in estimating the NBHCP Fee based on the revised NBHCP. These assumptions are consistent with previous analyses of the

Base Fee (e.g., the April 2002 NBHCP Fee Update included in Appendix I of the Draft NBHCP, July 2002).

LAND ACQUISITION

Land costs are currently estimated at \$6,000 per acre as shown in **Table 4**. Transaction and contingency costs are estimated at \$1,550. The transaction costs were increased by \$50 per acquired acre to provide for costs associated with the pre-acquisition survey the Natomas Basin Conservancy (TNBC) must perform prior to any HCP acquisition, as specified in the revised Draft NBHCP.

RESTORATION AND ENHANCEMENT

Table 5 presents the assumptions used for Restoration and Enhancement. The cost per acre for the Site-Specific Management Plan was increased to account for the need for a biological site assessment and a pre-construction survey as required by the revised NBHCP. As a result, the cost per acre for site specific management costs was doubled, from \$127 per acre to \$253 per acre.

The current cost estimate associated with restoration and enhancement (i.e., converting to managed marsh) was increased to \$5,200 from \$5,095. The \$5,200 cost per acre reflects the costs of converting acquired acres to managed marsh based on the most recent experience of the TNBC on the Betts/Kismat/Silva (BKS) property. In the previous fee analysis (April 2002), it was assumed that the future costs for restoration and enhancement would be reduced from those incurred in the BKS property. However, the TNBC no longer believes this will be the case, particularly given the four to five year lag time between when fees are collected and restoration and enhancement is completed. Restoration and enhancement costs will be closely monitored and the fee adjusted accordingly in the future to ensure that the monies collected will be adequate to fund the required restoration and enhancement projects.

As a result of these assumption changes, the fee for restoration and enhancement increased from \$782 per acre to \$893 per acre.

OPERATIONS & MAINTENANCE/ADMINISTRATION

Table 6, **Table 7**, and **Table 8** summarize the O&M and Administration assumptions for the NBHCP. The most significant change related to O&M/Administration is in the species and habitat mitigation monitoring requirements.

Table 8 details the increased mitigation monitoring requirements in relation to the revised NBHCP. The monitoring costs are based on estimates of what it would cost today assuming the 2,800 acres of habitat preserves. Other than the costs associated

with the mid-point program reviews, all the mitigation monitoring costs are inflated by 3 percent annually to reflect likely cost increases as habitat preserve acreage increases to 8,700 acres over time. Once all habitat acres are acquired, the costs are no longer escalated.

In addition to the increased monitoring requirements, the TNBC also would be responsible for increased reporting costs as well as costs associated with maintaining a database of all of the monitoring data. As a result, TNBC will need to hire an additional full-time staff person or contract with outside staff to manage these increased responsibilities. The costs associated with this additional staff person have been assumed in two locations in the cash flow analysis. The administrative costs have been increased in **Table 7** and by approximately \$62,000 per year to account for an allocation towards salary, benefits, and related office costs for a full-time staff costs. The remaining estimated staff costs of \$38,000 are assumed in the \$210,000 annual monitoring costs shown in **Table 8**.

The TNBC is also currently in the process of hiring a third staff person to fill the position of an Administrative Manager. The estimated cost related to this additional staff person is also included in **Table 8**.

The increase in O&M/ Administration costs results in an increase of the O&M/ Administration fee component from \$1,555 to \$2,850 per acre.

O&M ENDOWMENT

The sole function of the O&M Endowment fund is to ensure that the TNBC will be able to fund ongoing O&M of the habitat preserves and administer the program for the life of the permit and for the reserve management in perpetuity (forever). Once all fee revenues are paid, the O&M/ Administration fund will need another source of funding since crop revenues and hunting revenues will be insufficient to fully fund the HCP in any given year.

The O&M Endowment fund builds principle as fees are collected and as interest earnings are accrued. Towards the end of the 50-year permit period, the O&M/ Administration fund begins to drawdown on the endowment fund. The cash flow is structured such that only interest earnings are drawdown, never the principle balance.

The endowment fund is also structured such that the interest earnings are at least 1.2 times the annual drawdown amount. This allows the fund to continue to grow in perpetuity (forever). As a result, however, the principle balance in the current fee model grows to over \$66 million, as opposed to \$45 million in the April 2002 fee analysis. The higher principle balance (derived from higher fees) is necessary in order to ensure that the fund can generate the 1.2 times in interest earnings.

Because the costs related to O&M/ Administration have increased and the related fee, it is also necessary to increase the fee component for the O&M Endowment fund, from \$1,500 per acre to \$1,900 per acre.

SUPPLEMENTAL ENDOWMENT FUND

The Supplemental Endowment fund was created in 2001 to provide additional revenue to allow the TNBC to either purchase mitigation land in advance of requirements (such as establishing a 200 reserve land surplus) or to provide a cushion for land acquisition in the case that land prices spike in any given year before the fee can be adjusted accordingly.

Based on the revised NBHCP, TNBC is required to purchase the 200 acres and keep it in surplus through the end of the acquisition period. As a result the TNBC has purchased 200 acres and has financed this acquisition through a loan from the City of Sacramento. In order to build the acquisition cost as well as the financing cost into the fee program, the Supplemental Endowment fund cash flow was modified such that it shows the 200-acre acquisition in year 2002. The fund carries a negative fund balance, although it declines over time, until all fees have been paid. See **Table A-10** in the Appendix.

In addition, the Supplemental Endowment builds in a cost for Changed Circumstances, as required by the NBHCP. At this time exactly what constitutes or will constitute Changed Circumstances in the future is unknown. Therefore, a simple assumption of \$500 per acquired acre is assumed for Changed Circumstances.

The overall fee component for the Supplemental Endowment Fund increased from \$188 per acre to \$408 per acre based on these assumption changes.

CASH FLOW SUMMARY

Table 10 presents a summary of the cash flow funds through the end of the 50-year permit period. The detailed cash flows for each fund are presented in **Appendix A**.

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Table 1
Natomas Basin HCP -- July 2002
HCP Mitigation Fee Summary 1996-2002

Assumes
 17,500 acres of development
 1/2 acre of mitigation land per gross acre of developed land
 25% marsh

	Adopted						Proposed w/ Revised HCP
	1996/1997	1998	1999	2000	2001	2002	Fall 2002
Land Acquisition Cost (LA) [1]	\$1,830	\$1,830	\$2,036	\$2,500	\$3,000	\$3,750	\$3,775
Land Acquisition Settlement [3]					\$3,947	\$3,947	
Restoration/Enhancement (RE) [2]	\$140	\$198	\$200	\$423	\$368	\$782	\$893
Administration/O & M	\$150	\$475	\$800	\$750	\$1,555	\$1,555	\$2,850
O & M Endowment Fund	\$75	\$100	\$190	\$190	\$800	\$1,500	\$1,900
Supplemental Endowment Fund	\$0	\$0	\$0	\$0	\$150	\$188	\$408
Fee Collection Administration	\$45	\$53	\$66	\$78	\$201	\$240	\$201
Subtotal Mitigation Fee	\$2,240	\$2,656	\$3,292	\$3,941	\$10,021	\$11,962	\$10,027
<i>Percent Increase</i>		19%	24%	20%	154%	19%	

"hist_fee_sum"

- [1] Land acquisition cost includes land cost, transaction costs, and contingency costs. Acquisition costs estimated at \$4,000 to \$9,000 per acre.
 [2] Increases in RE fee components reflects the significant cost of restoring or enhancing marsh land to benefit Swainson's hawk and the giant garter snake.
 [3] Fee through 2002 only.

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Table 2
Natomas Basin HCP – July 2002
Estimation of Mitigation Fee

Assumes
 17,500 acres of development
 1/2 acre of mitigation land per gross acre of developed land
 25% marsh

<i>Estimation of Mitigation Fee</i>				Notes:
Mitigation Requirement	1/2 Acre of Mitigation Land for Each Gross Acre of Developed Land			
Habitat Mitigation Fee	<u>Cost per Acre of Habitat</u> a	<u>Mitigation Fee per Acre of Development</u> b=a x .5	<u>Percent of Base Fee</u>	
BASE FEE				
Land Acquisition Cost (LA)				
Land Cost	\$6,000 [1]	\$3,000		
Transaction Costs & Contingency	\$1,550 [1]	\$775		
Total Land Acquisition Cost (LA)	\$7,550	\$3,775	38%	
Restoration/Enhancement (RE)				
RE Cost	\$1,553	\$777		
RE Contingency	\$233	\$116		
Total Restoration/Enhancement (RE)	\$1,786	\$893	9%	
Administration/O & M	\$5,700 [2]	\$2,850	28%	
O & M Endowment Fund	\$3,800 [2]	\$1,900	19%	
Supplemental Endowment Fund	\$815	\$408	4%	5% of land acquisition fee
Subtotal Mitigation Fee	\$19,651	\$9,826		
Fee Collection Administration		\$201	2%	2% of fee for collection
Total Base Fee		\$10,027	100%	
<hr/>				
FEE EXCLUDING LAND ACQUISITION		\$6,252		[3]

"fee_sum_1"

- [1] Based on information provided by the Natomas Basin Conservancy
- [2] Administration/O&M and Endowment Fund costs set based on cash flow analysis, ensuring that fund balances are positive in year 50 and that annual interest earnings in endowment fund exceed drawdown by Admin/O&M fund.
- [3] In some cases developers may choose to dedicate land to satisfy the land acquisition component of the NBHCP. Any land dedication will be subject to the terms of the NBHCP

Table 3
Natomas Basin HCP -- July 2002
General Assumptions

Inflation	0.0%
Interest Rate	3.0%
Escalation Factor for Marsh Conversion	
In addition to Inflation Factor	0.0%
Mitigation Ratio	0.5
Habitat Acres Acquired to Date	2,782
Remaining Acres to be Acquired	5,918
Estimated Use of In-Basin Lands	
Marsh	25%
Existing Rice	50%
Other/Upland	25%
Total Initial Use	100%
Rice Converted to Marsh	After Year-5, 324 acres in marsh 25% thereafter
Rice Lands (excluding land converted to marsh) [2]	
Uplands/Fallow	10%
Leased for Other Crops	0%
Leased Rice Base Land	90%
Total Rice Lands	100%

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Table 4
Natomas Basin HCP -- July 2002
Land Acquisition Cost and
Acquired Habitat Land Utilization Assumptions

Assumes
17,500 acres of development
1/2 acre of mitigation land per gross acre of developed land
25% marsh

Item				Notes:	NBHCP Page Ref. #
Land Acquisition Values per Acre	<u>Land Value</u>	<u>Permitted by Plan</u>	<u>Assumed in Financial Analysis</u>		
In-Basin Lands	\$6,000	80%	100%	Based on survey of available land prices early 2002.	
Out-of-Basin Lands	\$3,250	20%	0%	Estimated \$3,100-\$3,500 per acre range per Recent Experience of NBHCP	
Average Land Value [1]	\$6,000	Use In-Basin Land Value			
Plus Transaction Costs & Contingency	\$1,550	per Acre		Includes Pre-acquisition field reconnaissance.	V-17
Average Land Acquisition Cost	\$7,550	per acquired acre		Beginning 1/1/02	
2002 Habitat Acres (Settlement Agreement)					
Average Land Value	\$9,450	per acquired acre			
Plus Transaction Costs & Contingency	\$1,550	per acquired acre			
Average Land Acquisition Cost	\$11,000	per acquired acre			

"Land_Acq_Assumps"
10365 model update Fall 02.xls

Source: Natomas Basin Conservancy

- [1] Assumes all acquisition occurs at the average in-basin land value.
[2] Rice Lands percents included for cost and revenue calculation purposes only.

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Table 5
Natomas Basin HCP – July 2002
Restoration & Enhancement Assumptions

Assumes
 17,500 acres of development
 1/2 acre of mitigation land per gross acre of developed land
 25% marsh

Item	Estimated Cost	Estimated Cost per Acre	Note:	NBHCP Page #
Site Specific Management Plan Costs				
NBHCP Biological Site Assessment	\$15,000 per Acquisition	\$76 per Acquired Acre assumes 30 more acquisitions	Baseline Biological site assessments for: -Tri-Colored Blackbird -Valley Elderberry Longhorn Beetle -Delta Tule Pea -Sanford Arrowhead Assessment for Species Introduction: -Delta Tule Pea -CTS -ST -Pond Turtle -Sanford Arrowhead -Vernal Pool Plant Species, -Other Covered Plant Species	IV-25; V-22; V-25; V-26; VI-15
NBHCP Pre-construction Survey	\$12,000 per Acquisition	\$61 per Acquired Acre assumes 30 more acquisitions	Formal pre-construction site survey for restoration and enhancement, including: -Assessment of Swainsons Hawk nest disturbance -Assessment of Other Avian Species nest disturbance -Assessment of Valley Eldeberry Longhorn Beetle	V-17; V-20; V-25
Preparation of Site Specific Management Plan	\$23,000 per Acquisition	\$117 per Acquired Acre	Assumes 30 more acquisitions.	
Subtotal SSMP Cost Per Acre		\$253 per acre	Note [1]	
To be Completed:	Within 1 Year of Reserve Acquisition			
Restoration & Enhancement				
	<u>Use of Land</u>	<u>Initial Costs</u>	<u>Weighted Cost [5]</u>	
<i>Expended At Time Land Is Acquired</i>				
Marsh	0%	\$0	\$0	Note [2], [3]
Existing Rice	75%	\$0	\$0	Note [3]
Dry Converted to Rice	0%	\$0	\$0	Note [3]
Other Upland	25%	\$0	\$0	Note [3]
Subtotal	100%		\$0	
<i>Expended At Time Land Is Converted</i>				
Rice/Other Converted to Marsh	25%	\$5,200	\$1,300	Note [4]
Subtotal Restoration & Enhancement			\$1,300	
R&E Cost Per Acre			\$1,553	Weighted average cost per Acquired Acre
R&E Contingency (@ 15%)			\$233	Per Acquired Acre

RE_Assumps
 10365 model update Fall 02.xls

Source: The Natomas Basin Conservancy

- [1] The addition of a formal biological site assessment and pre-construction survey are required by the Draft HCP – July 2002.
- [2] Initial use of marsh land estimated at 0% because NBHCP estimates that little to no marshland is available for acquisition. However, rice land will be converted to marsh land.
- [3] The initial costs of marsh, existing rice, dry land converted to rice and other upland have been set to zero as no initial restoration or enhancement costs are anticipated.
- [4] In 2001, the cost of converting of acquired acres to marsh cost approximately \$5,200 per acre.
- [5] The cost of restoration and enhancement is weighted by the percent of acres assumed to be converted or used for that particular land use.

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Table 6
Natomas Basin HCP -- July 2002
Operations & Maintenance Assumptions

Assumes
 17,500 acres of development
 1/2 acre of mitigation land per gross acre of developed land
 25% marsh

<i>Item</i>		<i>Notes:</i>
Operations & Maintenance Costs		
Marsh	\$281.00 per acre	Updated Cost -- May 2001 Based on Wildlands, Inc. Estimates Based on Wildlands, Inc. Estimates alfalfa, safflower, etc.
Upland/Fallow	\$18.25 per acre	
Land Leased for Planted Rice Base	\$2.67 per acre	
Land Leased for Other Crops	\$2.67 per acre	
Other	\$0.00 per acre	
Hunting	\$0.00 per acre	Updated Cost -- May 2001
Miscellaneous Maintenance Costs	\$23.65 per acre	Based on Wildlands, Inc. Estimates
Special Assessment & Property Tax Costs		
<u>Sacramento County</u>		
Reclamation District #1000	\$13.08 per acre	Based on published tariffs and rates
NCMWA	\$0.42 per acre	Based on published tariffs and rates
SAFCA O&M Assessment #1	\$5.69 per acre	Based on published tariffs and rates
CSAI Safety Lights	\$0.08 per acre	Based on published tariffs and rates
Property Tax [1]	\$54.42 per acre	Based on average assessed value of all properties acquired through Feb. 2002 -- \$5,100 per acre
Subtotal Sacramento County	\$73.68 per acre	
<u>Sutter County</u>		
Reclamation District #1000	\$13.08 per acre	Based on published tariffs and rates
NCMWC	\$0.42 per acre	Based on published tariffs and rates
Property Tax	\$51.00 per acre	Based on average assessed value of all properties acquired through Feb. 2002 -- \$5,100 per acre
Subtotal Sutter County	\$64.50 per acre	
Mitigation Monitoring & Adaptive Management		
One-Time/Fixed Costs	\$7,500	
On-Going Monitoring	\$203,040 per year	See Table 8 for detail
Administrative Costs		
During Development	\$756,585 per year	See Table 7 for detail
After All Land Acquired	\$756,585 per year	
Operations & Maintenance Revenues		
Crop Land Leases		
<u>Through 2002</u>		
Planted Rice Base Acreage	\$160 per acre/year	normal ag. practices
Other Crops (Flex. acreage)	\$80 per acre/year	normal ag. practices
<u>2003 +</u>		
Planted Rice Base Acreage	\$160 per acre/year	normal ag. practices
Other Crops (Flex. acreage)	\$80 per acre/year	normal ag. practices
Hunting		
Hunting Revenue per Acre	\$12 per acre	Based on Wildlands Estimate for initial Site Plan

Source: The Natomas Basin Conservancy

OM_Assumps

[1] Includes G.O. bond assessment.

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Table 7
Natomas Basin HCP
Estimated Annual Natomas Basin Conservancy (NBC) Administrative Costs

	Annual Cost	Notes
<u>Administrative Expenses</u>		
Staff	\$280,000	
Benefits	\$92,400	
Board Expense	\$6,000	
Subtotal	\$378,400	
<u>Office Expense</u>		
Rent	\$20,000	
Telephone	\$2,100	
Copying & Printing	\$23,000	
Office Supplies	\$8,000	
Postage	\$900	
Equipment	\$5,000	
Auto Expense	\$9,500	
Subtotal	\$68,500	
<u>Miscellaneous Expense</u>		
Insurance	\$25,000	Liability and E&O
Accounting	\$20,000	
Legal	\$80,000	
Corporate Taxes	\$1,000	
Subtotal	\$126,000	
Contract Work & Public Education	\$45,000	
Publications, Printing, & Distribution	\$40,000	
Subtotal Costs	\$657,900	
Contingency	\$98,685	15% Contingency
Total Administration During Habitat Acquisition Phase	\$756,585	
Total Administration After Habitat Acquisition	\$756,585	[1]

"admin_assumps"
10365 model update Fall 02.xls

Source: NBC FY 2001 budget estimate; Draft HCP July 2002

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Table 8
Natomas Basin HCP -- July 2002
Species & Habitat Monitoring Cost Assumptions

Item	Description	Total Cost	Interval (Years)	Cost per unit	Annualized Cost	Comments	NBHCP Pg. #
					50 Years		
<u>Fixed or One-Time Costs</u>							
Mid-Point Program Reviews	Mid-Point Program Review for Permittees & Overall Program Review	\$375,000	3	\$125,000	\$7,500	Written report required; extensive requirements; refer to NBHCP. Assumes the Overall Program Review will happen concurrently with one of the Permittee Reviews	VI-28
Connectivity -- Acquisition Costs	Ensure connectivity through easements, etc. Acquisition costs. Estimate -- 10 miles of abandoned water conveyance structures	NA		NA	NA	Assumed to be applied towards habitat preserve land acquisition requirements. Therefore, it assumed costs would be absorbed under land acquisition.	IV-8
Land Acquisition Restrictions	Setback; no mitigation land designated for urban use.	NA		NA	NA	Greatly restricts land available for mitigation land acquisition resulting in much higher costs.	IV-11
Subtotal					\$7,500		
<u>Annual Monitoring & Reporting Requirements</u>							
Biological Effectiveness Monitoring Plan							
Giant Garter Snake	Annual Field Survey -- Basinwide	\$1,600,000	40	\$40,000	\$32,000		VI-19
Swainson's Hawk	Annual Field Survey -- Basinwide	\$1,000,000	40	\$25,000	\$20,000		V-18; VI-20
Other Covered Species	Annual monitoring of Preserve Sites & Control Sites for: -Delta Tule Pea -Sanford Arrowhead -VP Plants	\$400,000	40	\$10,000	\$8,000	Site Specific Monitoring Programs Must monitor known populations annually and file report.	V-26; VI-15

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Table 8
 Natomas Basin HCP -- July 2002
 Species & Habitat Monitoring Cost Assumptions

Item	Description	Total Cost	Interval (Years)	Cost per unit	Annualized Cost	Comments	NBHCP Pg. #
Connectivity-- Assessment		\$120,000	40	\$3,000	\$2,400	Level of effort assumed - letter to the water agency requesting information, and subsequent documentation based on info provided by water agencies. No independent assessment by TNBC assumed.	VI-15
Reporting Costs							Assumed in administrative budget.
Other Annual Costs							
Connectivity -- O&M	Ensure connectivity through easements, etc. Management and maintenance.	\$250,000	10	\$5,000	\$5,000	Estimate 10 miles of abandonment. This is only a rough estimate due to the uncertainty of accounting for this eventuality. Suggest hiring water agency to maintain and manage acquired structures with the cost shown serving as an estimate of contract cost. Estimate costs for water and maintenance at \$500/mile.	IV-8
Avian Species Monitoring	General Habitat Monitoring-- including wintering bird species evaluation	\$750,000	50	\$15,000	\$15,000	"...additional surveys should be carried out...to detect actual species...on and off mitigation lands. Seven to 14-days per year; annual estimates of avian colonies...size and nesting success...must determine habitat characteristics.	VI-20
Subtotal					\$82,400		
<u>5-Year Monitoring & Reporting Requirements</u>							
Biological Effectiveness Monitoring Plan							
Annual Biological Effectiveness Assessment		\$780,000	10	\$78,000	\$15,600	See Above	

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Table 8
Natomas Basin HCP -- July 2002
Species & Habitat Monitoring Cost Assumptions

Item	Description	Total Cost	Interval (Years)	Cost per unit	Annualized Cost	Comments	NBHCP Pg. #
Additional Monitoring Requirements	Five-Year Inventory of Reserve Lands Botanical inventory Rarely occurring species inventory Seasonal wetland monitoring/surveying	\$550,000	10	\$55,000	\$11,000	Density and distribution of all covered species on reserves.	VI-14; VI-20; VI-21;
Adaptive Management	Review of Biological Effectiveness Monitoring Program procedures and practices.	\$200,000	10	\$20,000	\$4,000	"Whenever review indicates revision is necessary to effectively monitor the success...of goals and objectives." Outside, independent, third-party likely required to conduct for compliance.	VI-22
Subtotal					\$30,600		
Other Costs							
Adaptive Management	Periodic Review of NBHCP Monitoring Data	\$180,000	10	\$18,000	\$3,600	Review data, new science, future recovery plans, TAC recs, i.d. threshold limits. Suggest outside, third-party independent contractor needs to do to achieve compliance.	VI-23
Adaptive Management	Report to Review Adaptive Management.	\$306,000	17	\$18,000	\$6,120	Assess adaptive management in published reports using scientific information, research and baseline inventories, etc. And file report with agencies.	VI-23
Data Management	Database Management; Validity and Reliability Testing Evaluation	\$1,000,000	50	\$20,000	\$20,000	Provide report on complete database to Resources Agencies annually. Reliability Evaluation required annually; w/TAC or third party approved by the Wildlife Agencies.	VI-24
Subtotal					\$29,720		

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Table 8
Natomas Basin HCP -- July 2002
Species & Habitat Monitoring Cost Assumptions

Item	Description	Total Cost	Interval (Years)	Cost per unit	Annualized Cost	Comments	NBHCP Pg. #
Total Annual Cost					\$210,540		
Habitat Acres through 2002					2,788		
Annual Cost Per Acre					\$75.52		

"Monitoring_Assumps"

Source: The Natomas Basin Conservancy

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Table 9
Natomas Basin HCP -- July 2002
Supplemental Endowment Cost Assumptions

Item	Base Cost per Acre	Cost per Acre Including Int Cost	Total Est. Acquisition Cost	Allocated Cost	Note:
200 Acre Reserve -- Contingency Fund	\$8,000	\$10,400 [1]	\$2,080,000	\$315 per Acquired Acre	Allocated over remaining reserve requirement (6,600 acres)
Changed Circumstances					
Managed Marsh Contingency				per Acquired Acre	Note [2]
Other Changed Circumstance Contingency				\$500 per Acquired Acre	
Total				\$815 per Acquired Acre	

"*supp_endow_assumps*"

Source: The Natomas Basin Conservancy and EPS

[1] Includes a financing factor of 30% ($\$8,000 * 1.3 = \$10,400$).

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Table 10
Natomas Basin HCP
Cash Flow Summary- 2002\$

Assumes:	0.0% Inflation
	3.0% Interest Rate

	Total 1996-2045	1 1996	2 1997	3 1998	4 1999	5 2000	6 2001	7 2002	8 2003
LAND ACQUISITION		[1]	[1]	[1]	[2]				
Beginning Balance		\$0	\$55,641	\$247,608	\$2,773,665	\$545,571	\$563,113	\$2,225,278	(\$2,007,870)
Total Revenues	\$64,621,447	\$55,641	\$191,966	\$2,526,057	\$2,696,904	\$1,287,471	\$3,198,070	\$3,941,346	\$4,462,910
Total Expenditures	(\$56,510,403)	\$0	\$0	\$0	(\$4,924,998)	(\$1,647,666)	(\$1,535,905)	(\$9,510,155)	(\$1,569,213)
Transfers from Admin/O&M Fund	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$1,335,661	(\$1,335,661)
Balance Adjustments	\$377,738	\$0	\$0	\$0	\$0	\$377,738	\$0	\$0	\$0
Ending Balance	\$8,488,781	\$55,641	\$247,608	\$2,773,665	\$545,571	\$563,113	\$2,225,278	(\$2,007,870)	(\$449,834)
RESTORATION & ENHANCEMENTS									
Beginning Balance		\$0	\$4,257	\$19,032	\$292,743	\$589,200	\$582,058	\$268,280	\$375,241
Total Revenues	\$13,688,163	\$4,257	\$14,775	\$273,711	\$296,457	\$145,324	\$746,644	\$452,121	\$1,056,627
Total Expenditures	(\$13,163,748)	\$0	\$0	\$0	\$0	\$0	(\$1,060,422)	(\$345,161)	(\$462,832)
Balance Adjustments	(\$152,466)	\$0	\$0	\$0	\$0	(\$152,466)	\$0	\$0	\$0
Ending Balance	\$371,949	\$4,257	\$19,032	\$292,743	\$589,200	\$582,058	\$268,280	\$375,241	\$969,035
ADMINISTRATION/O&M									
Beginning Balance		\$0	\$4,561	\$70,261	\$621,109	\$1,172,809	\$1,549,539	\$1,754,659	\$167,061
Total Revenues	\$82,462,946	\$4,561	\$65,700	\$657,778	\$878,604	\$686,778	\$816,275	\$1,035,862	\$3,583,074
Drawdown on Endowment Fund	\$11,459,781	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Total Expenditures	(\$94,153,763)	\$0	\$0	(\$106,930)	(\$326,904)	(\$541,084)	(\$611,155)	(\$1,287,799)	(\$1,333,577)
Balance Adjustments (Inc. Transfers)	\$231,035	\$0	\$0	\$0	\$0	\$231,035	\$0	(\$1,335,661)	\$1,335,661
Ending Balance	\$0	\$4,561	\$70,261	\$621,109	\$1,172,809	\$1,549,539	\$1,754,659	\$167,061	\$3,752,219
O&M ENDOWMENT									
Beginning Balance		\$0	\$3,041	\$13,622	\$152,066	\$323,846	\$463,981	\$1,003,066	\$1,988,158
Total Revenues	\$75,769,670	\$3,041	\$10,581	\$138,445	\$157,704	\$140,135	\$539,085	\$985,092	\$2,296,283
Drawdown on Endowment Fund	(\$11,459,781)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Balance Adjustments	\$14,076	\$0	\$0	\$0	\$14,076	\$0	\$0	\$0	\$0
Ending Balance	\$64,323,965	\$3,041	\$13,622	\$152,066	\$323,846	\$463,981	\$1,003,066	\$1,988,158	\$4,284,441
SUPPLEMENTAL ENDOWMENT									
Beginning Balance		\$0	\$0	\$0	\$0	\$0	\$0	\$58,799	(\$1,925,438)
Total Revenues	\$5,470,315	\$0	\$0	\$0	\$0	\$0	\$58,799	\$95,764	\$479,172
Total Expenditures	(\$5,337,202)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Ending Balance	\$133,114	\$0	\$0	\$0	\$0	\$0	\$58,799	\$154,562	(\$1,446,266)
Changed Circumstances Fund Balance		\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$293,610

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Table 10
Natomas Basin HCP
Cash Flow Summary- 2002\$

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	9 2004	10 2005	11 2006	12 2007	13 2008	14 2009	15 2010	16 2011	17 2012
LAND ACQUISITION									
Beginning Balance	(\$449,834)	\$268,582	\$1,001,525	\$1,745,626	\$2,500,887	\$2,897,668	\$3,259,870	\$3,627,506	\$4,000,655
Total Revenues	\$4,675,471	\$4,699,365	\$4,710,522	\$4,721,684	\$2,031,014	\$1,996,436	\$2,001,869	\$2,007,383	\$2,012,981
Total Expenditures	(\$3,957,054)	(\$3,966,422)	(\$3,966,422)	(\$3,966,422)	(\$1,634,233)	(\$1,634,233)	(\$1,634,233)	(\$1,634,233)	(\$1,634,233)
Transfers from Admin/O&M Fund	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Balance Adjustments	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Ending Balance	\$268,582	\$1,001,525	\$1,745,626	\$2,500,887	\$2,897,668	\$3,259,870	\$3,627,506	\$4,000,655	\$4,379,403
RESTORATION & ENHANCEMENTS									
Beginning Balance	\$969,035	\$388,778	\$798,517	\$740,514	\$892,652	\$499,371	\$97,832	\$153,105	\$209,539
Total Revenues	\$1,104,815	\$1,095,197	\$1,103,802	\$1,102,584	\$466,622	\$458,363	\$449,931	\$451,091	\$452,276
Total Expenditures	(\$1,685,073)	(\$685,458)	(\$1,161,805)	(\$950,446)	(\$859,902)	(\$859,902)	(\$394,657)	(\$394,657)	(\$394,657)
Balance Adjustments	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Ending Balance	\$388,778	\$798,517	\$740,514	\$892,652	\$499,371	\$97,832	\$153,105	\$209,539	\$267,158
ADMINISTRATION/O&M									
Beginning Balance	\$3,752,219	\$6,173,247	\$8,673,418	\$11,193,613	\$13,823,241	\$14,443,752	\$15,035,918	\$15,631,890	\$16,223,949
Total Revenues	\$3,831,158	\$3,984,212	\$4,101,138	\$4,295,443	\$2,344,092	\$2,372,688	\$2,410,014	\$2,447,454	\$2,484,776
Drawdown on Endowment Fund	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Total Expenditures	(\$1,410,131)	(\$1,484,040)	(\$1,580,943)	(\$1,665,814)	(\$1,723,582)	(\$1,780,522)	(\$1,814,042)	(\$1,855,395)	(\$1,896,981)
Balance Adjustments (Inc. Transfers)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Ending Balance	\$6,173,247	\$8,673,418	\$11,193,613	\$13,823,241	\$14,443,752	\$15,035,918	\$15,631,890	\$16,223,949	\$16,811,744
O&M ENDOWMENT									
Beginning Balance	\$4,284,441	\$6,725,821	\$9,246,121	\$11,842,254	\$14,516,506	\$15,911,282	\$17,348,155	\$18,828,397	\$20,353,320
Total Revenues	\$2,441,380	\$2,520,300	\$2,596,134	\$2,674,252	\$1,394,776	\$1,436,873	\$1,480,242	\$1,524,923	\$1,570,955
Drawdown on Endowment Fund	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Balance Adjustments	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Ending Balance	\$6,725,821	\$9,246,121	\$11,842,254	\$14,516,506	\$15,911,282	\$17,348,155	\$18,828,397	\$20,353,320	\$21,924,275
SUPPLEMENTAL ENDOWMENT									
Beginning Balance	(\$1,739,876)	(\$1,547,994)	(\$1,355,658)	(\$1,163,322)	(\$970,986)	(\$891,741)	(\$812,495)	(\$733,249)	(\$654,003)
Total Revenues	\$495,492	\$496,665	\$496,665	\$496,665	\$204,634	\$204,634	\$204,634	\$204,634	\$204,634
Total Expenditures	(\$2,080,000)	(\$293,610)	(\$303,610)	(\$304,329)	(\$304,329)	(\$304,329)	(\$125,389)	(\$125,389)	(\$125,389)
Ending Balance	(\$3,324,384)	(\$1,344,939)	(\$1,162,603)	(\$970,986)	(\$1,070,681)	(\$991,435)	(\$733,249)	(\$654,003)	(\$574,758)
Changed Circumstances Fund Balance	\$606,029	\$928,539	\$1,260,724	\$1,602,875	\$1,776,350	\$1,955,029	\$2,139,069	\$2,328,630	\$2,523,877

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Table 10
Natomas Basin HCP
Cash Flow Summary- 2002\$

	18 2013	19 2014	20 2015	21 2016	22 2017	23 2018	24 2019	25 2020
LAND ACQUISITION								
Beginning Balance	\$4,379,403	\$4,659,012	\$4,931,328	\$5,207,729	\$5,488,275	\$5,642,593	\$5,796,911	\$5,951,229
Total Revenues	\$1,252,809	\$1,245,515	\$1,249,600	\$1,253,746	\$1,127,517	\$1,127,517	\$1,127,517	\$1,127,517
Total Expenditures	(\$973,199)	(\$973,199)	(\$973,199)	(\$973,199)	(\$973,199)	(\$973,199)	(\$973,199)	(\$973,199)
Transfers from Admin/O&M Fund	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Balance Adjustments	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Ending Balance	\$4,659,012	\$4,931,328	\$5,207,729	\$5,488,275	\$5,642,593	\$5,796,911	\$5,951,229	\$6,105,547
RESTORATION & ENHANCEMENTS								
Beginning Balance	\$267,158	\$170,488	\$71,788	\$102,885	\$134,634	\$164,223	\$193,812	\$223,400
Total Revenues	\$272,324	\$270,294	\$268,221	\$268,874	\$266,714	\$266,714	\$266,714	\$266,714
Total Expenditures	(\$368,994)	(\$368,994)	(\$237,125)	(\$237,125)	(\$237,125)	(\$237,125)	(\$237,125)	(\$237,125)
Balance Adjustments	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Ending Balance	\$170,488	\$71,788	\$102,885	\$134,634	\$164,223	\$193,812	\$223,400	\$252,989
ADMINISTRATION/O&M								
Beginning Balance	\$16,811,744	\$16,812,353	\$16,786,109	\$16,767,220	\$16,730,436	\$16,674,952	\$16,599,930	\$16,504,500
Total Revenues	\$1,932,213	\$1,940,228	\$1,982,496	\$1,993,578	\$2,004,123	\$2,014,107	\$2,023,504	\$2,032,290
Drawdown on Endowment Fund	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Total Expenditures	(\$1,931,604)	(\$1,966,472)	(\$2,001,385)	(\$2,030,362)	(\$2,059,607)	(\$2,089,128)	(\$2,118,934)	(\$2,149,033)
Balance Adjustments (Inc. Transfers)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Ending Balance	\$16,812,353	\$16,786,109	\$16,767,220	\$16,730,436	\$16,674,952	\$16,599,930	\$16,504,500	\$16,387,757
O&M ENDOWMENT								
Beginning Balance	\$21,924,275	\$23,157,193	\$24,427,406	\$25,736,045	\$27,084,277	\$28,473,302	\$29,904,358	\$31,378,720
Total Revenues	\$1,232,918	\$1,270,213	\$1,308,640	\$1,348,232	\$1,389,025	\$1,431,056	\$1,474,362	\$1,518,983
Drawdown on Endowment Fund	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Balance Adjustments	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Ending Balance	\$23,157,193	\$24,427,406	\$25,736,045	\$27,084,277	\$28,473,302	\$29,904,358	\$31,378,720	\$32,897,703
SUPPLEMENTAL ENDOWMENT								
Beginning Balance	(\$574,758)	(\$527,566)	(\$480,375)	(\$433,183)	(\$385,992)	(\$338,801)	(\$291,609)	(\$244,418)
Total Revenues	\$121,861	\$121,861	\$121,861	\$121,861	\$121,861	\$121,861	\$121,861	\$121,861
Total Expenditures	(\$125,389)	(\$125,389)	(\$74,670)	(\$74,670)	(\$74,670)	(\$74,670)	(\$74,670)	(\$74,670)
Ending Balance	(\$578,285)	(\$531,094)	(\$433,183)	(\$385,992)	(\$338,801)	(\$291,609)	(\$244,418)	(\$197,226)
Changed Circumstances Fund Balance	\$2,674,264	\$2,829,161	\$2,988,706	\$3,153,037	\$3,322,299	\$3,496,638	\$3,676,207	\$3,861,163

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Table 10
Natomas Basin HCP
Cash Flow Summary- 2002\$

	26 2021	27 2022	28 2023	29 2024	30 2025	31 2026	32 2027	33 2028	34 2029
LAND ACQUISITION									
Beginning Balance	\$6,105,547	\$6,259,865	\$6,414,183	\$6,568,501	\$6,722,819	\$6,877,137	\$7,361,264	\$8,488,781	\$8,488,781
Total Revenues	\$1,127,517	\$1,127,517	\$1,127,517	\$1,127,517	\$1,127,517	\$1,127,517	\$1,127,517	\$0	\$0
Total Expenditures	(\$973,199)	(\$973,199)	(\$973,199)	(\$973,199)	(\$973,199)	(\$643,391)	\$0	\$0	\$0
Transfers from Admin/O&M Fund	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Balance Adjustments	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Ending Balance	\$6,259,865	\$6,414,183	\$6,568,501	\$6,722,819	\$6,877,137	\$7,361,264	\$8,488,781	\$8,488,781	\$8,488,781
RESTORATION & ENHANCEMENTS									
Beginning Balance	\$252,989	\$282,578	\$312,167	\$341,755	\$371,344	\$400,933	\$443,326	\$510,698	\$377,149
Total Revenues	\$266,714	\$266,714	\$266,714	\$266,714	\$266,714	\$266,714	\$266,714	\$0	\$0
Total Expenditures	(\$237,125)	(\$237,125)	(\$237,125)	(\$237,125)	(\$237,125)	(\$224,321)	(\$199,342)	(\$133,549)	(\$5,200)
Balance Adjustments	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Ending Balance	\$282,578	\$312,167	\$341,755	\$371,344	\$400,933	\$443,326	\$510,698	\$377,149	\$371,949
ADMINISTRATION/O&M									
Beginning Balance	\$16,387,757	\$16,248,758	\$16,086,526	\$15,900,042	\$15,688,249	\$15,450,048	\$15,182,424	\$14,880,477	\$13,708,446
Total Revenues	\$2,040,436	\$2,047,915	\$2,054,696	\$2,060,750	\$2,066,045	\$2,065,082	\$2,052,573	\$1,188,722	\$1,153,561
Drawdown on Endowment Fund	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Total Expenditures	(\$2,179,435)	(\$2,210,147)	(\$2,241,180)	(\$2,272,543)	(\$2,304,246)	(\$2,332,706)	(\$2,354,519)	(\$2,360,753)	(\$2,360,753)
Balance Adjustments (Inc. Transfers)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Ending Balance	\$16,248,758	\$16,086,526	\$15,900,042	\$15,688,249	\$15,450,048	\$15,182,424	\$14,880,477	\$13,708,446	\$12,501,254
O&M ENDOWMENT									
Beginning Balance	\$32,897,703	\$34,462,660	\$36,074,988	\$37,736,123	\$39,447,549	\$41,210,791	\$43,027,423	\$44,899,067	\$46,259,901
Total Revenues	\$1,564,957	\$1,612,327	\$1,661,135	\$1,711,425	\$1,763,242	\$1,816,632	\$1,871,644	\$1,360,834	\$1,402,214
Drawdown on Endowment Fund	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Balance Adjustments	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Ending Balance	\$34,462,660	\$36,074,988	\$37,736,123	\$39,447,549	\$41,210,791	\$43,027,423	\$44,899,067	\$46,259,901	\$47,662,115
SUPPLEMENTAL ENDOWMENT									
Beginning Balance	(\$197,226)	(\$150,035)	(\$102,843)	(\$55,652)	(\$8,460)	\$38,731	\$85,922	\$133,114	\$133,114
Total Revenues	\$121,861	\$121,861	\$121,861	\$121,861	\$121,861	\$121,861	\$121,861	\$0	\$0
Total Expenditures	(\$74,670)	(\$74,670)	(\$74,670)	(\$74,670)	(\$74,670)	(\$74,670)	(\$74,670)	(\$74,670)	(\$74,670)
Ending Balance	(\$150,035)	(\$102,843)	(\$55,652)	(\$8,460)	\$38,731	\$85,922	\$133,114	\$58,444	\$58,444
Changed Circumstances Fund Balance	\$4,051,668	\$4,247,888	\$4,449,994	\$4,658,164	\$4,872,579	\$5,093,427	\$5,320,899	\$5,480,526	\$5,644,942

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Table 10
Natomas Basin HCP
Cash Flow Summary- 2002\$

	35 2030	36 2031	37 2032	38 2033	39 2034	40 2035	41 2036	42 2037	43 2038
LAND ACQUISITION									
Beginning Balance	\$8,488,781	\$8,488,781	\$8,488,781	\$8,488,781	\$8,488,781	\$8,488,781	\$8,488,781	\$8,488,781	\$8,488,781
Total Revenues	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Total Expenditures	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Transfers from Admin/O&M Fund	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Balance Adjustments	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Ending Balance	\$8,488,781								
RESTORATION & ENHANCEMENTS									
Beginning Balance	\$371,949	\$371,949	\$371,949	\$371,949	\$371,949	\$371,949	\$371,949	\$371,949	\$371,949
Total Revenues	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Total Expenditures	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Balance Adjustments	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Ending Balance	\$371,949								
ADMINISTRATION/O&M									
Beginning Balance	\$12,501,254	\$11,257,846	\$9,977,135	\$8,658,004	\$7,299,298	\$5,899,831	\$4,458,381	\$2,973,686	\$1,444,451
Total Revenues	\$1,117,345	\$1,080,043	\$1,041,622	\$1,002,048	\$961,287	\$919,303	\$876,059	\$831,518	\$785,641
Drawdown on Endowment Fund	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$130,661
Total Expenditures	(\$2,360,753)	(\$2,360,753)	(\$2,360,753)	(\$2,360,753)	(\$2,360,753)	(\$2,360,753)	(\$2,360,753)	(\$2,360,753)	(\$2,360,753)
Balance Adjustments (Inc. Transfers)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Ending Balance	\$11,257,846	\$9,977,135	\$8,658,004	\$7,299,298	\$5,899,831	\$4,458,381	\$2,973,686	\$1,444,451	\$0
O&M ENDOWMENT									
Beginning Balance	\$47,662,115	\$49,106,972	\$50,595,774	\$52,129,865	\$53,710,626	\$55,339,485	\$57,017,912	\$58,747,421	\$60,529,574
Total Revenues	\$1,444,857	\$1,488,802	\$1,534,090	\$1,580,762	\$1,628,859	\$1,678,426	\$1,729,509	\$1,782,153	\$1,836,407
Drawdown on Endowment Fund	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	(\$130,661)
Balance Adjustments	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Ending Balance	\$49,106,972	\$50,595,774	\$52,129,865	\$53,710,626	\$55,339,485	\$57,017,912	\$58,747,421	\$60,529,574	\$62,235,320
SUPPLEMENTAL ENDOWMENT									
Beginning Balance	\$133,114	\$133,114	\$133,114	\$133,114	\$133,114	\$133,114	\$133,114	\$133,114	\$133,114
Total Revenues	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Total Expenditures	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Ending Balance	\$133,114								
Changed Circumstances Fund Balance	\$5,814,290	\$5,988,719	\$6,168,381	\$6,353,432	\$6,544,035	\$6,740,356	\$6,942,567	\$7,150,844	\$7,365,369

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Table 10
Natomas Basin HCP
Cash Flow Summary- 2002\$

	44 2039	45 2040	46 2041	47 2042	48 2043	49 2044	50 2045	51 2046	52 2047
LAND ACQUISITION									
Beginning Balance	\$8,488,781	\$8,488,781	\$8,488,781	\$8,488,781	\$8,488,781	\$8,488,781	\$8,488,781	\$8,488,781	\$8,488,781
Total Revenues	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Total Expenditures	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Transfers from Admin/O&M Fund	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Balance Adjustments	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Ending Balance	\$8,488,781								
RESTORATION & ENHANCEMENTS									
Beginning Balance	\$371,949	\$371,949	\$371,949	\$371,949	\$371,949	\$371,949	\$371,949	\$371,949	\$371,949
Total Revenues	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Total Expenditures	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Balance Adjustments	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Ending Balance	\$371,949								
ADMINISTRATION/O&M									
Beginning Balance	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Total Revenues	\$742,308	\$742,308	\$742,308	\$742,308	\$742,308	\$742,308	\$742,308	\$742,308	\$742,308
Drawdown on Endowment Fund	\$1,618,446	\$1,618,446	\$1,618,446	\$1,618,446	\$1,618,446	\$1,618,446	\$1,618,446	\$1,618,446	\$1,618,446
Total Expenditures	(\$2,360,753)	(\$2,360,753)	(\$2,360,753)	(\$2,360,753)	(\$2,360,753)	(\$2,360,753)	(\$2,360,753)	(\$2,360,753)	(\$2,360,753)
Balance Adjustments (Inc. Transfers)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Ending Balance	\$0								
O&M ENDOWMENT									
Beginning Balance	\$62,235,320	\$62,505,274	\$62,784,180	\$63,072,342	\$63,370,072	\$63,677,693	\$63,995,542	\$64,323,965	\$64,663,321
Total Revenues	\$1,888,400	\$1,897,352	\$1,906,607	\$1,916,175	\$1,926,067	\$1,936,295	\$1,946,869	\$1,957,802	\$1,939,900
Drawdown on Endowment Fund	(\$1,618,446)	(\$1,618,446)	(\$1,618,446)	(\$1,618,446)	(\$1,618,446)	(\$1,618,446)	(\$1,618,446)	(\$1,618,446)	(\$1,618,446)
Balance Adjustments	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Ending Balance	\$62,505,274	\$62,784,180	\$63,072,342	\$63,370,072	\$63,677,693	\$63,995,542	\$64,323,965	\$64,663,321	\$64,984,775
SUPPLEMENTAL ENDOWMENT									
Beginning Balance	\$133,114	\$133,114	\$133,114	\$133,114	\$133,114	\$133,114	\$133,114	\$133,114	\$133,114
Total Revenues	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Total Expenditures	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Ending Balance	\$133,114								
Changed Circumstances Fund Balance	\$7,586,330	\$7,813,920	\$8,048,338	\$8,289,788	\$8,538,481	\$8,794,636	\$9,058,475	\$9,330,229	\$9,610,136

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**Table 10
Natomas Basin HCP
Cash Flow Summary- 2002\$**

	53 2048	54 2049	55 2050
LAND ACQUISITION			
Beginning Balance	\$8,488,781	\$8,488,781	\$8,488,781
Total Revenues	\$0	\$0	\$0
Total Expenditures	\$0	\$0	\$0
Transfers from Admin/O&M Fund	\$0	\$0	\$0
Balance Adjustments	\$0	\$0	\$0
Ending Balance	\$8,488,781	\$8,488,781	\$8,488,781
RESTORATION & ENHANCEMENTS			
Beginning Balance	\$371,949	\$371,949	\$371,949
Total Revenues	\$0	\$0	\$0
Total Expenditures	\$0	\$0	\$0
Balance Adjustments	\$0	\$0	\$0
Ending Balance	\$371,949	\$371,949	\$371,949
ADMINISTRATION/O&M			
Beginning Balance	\$0	\$0	\$0
Total Revenues	\$742,308	\$742,308	\$742,308
Drawdown on Endowment Fund	\$1,618,446	\$1,618,446	\$1,618,446
Total Expenditures	(\$2,360,753)	(\$2,360,753)	(\$2,360,753)
Balance Adjustments (Inc. Transfers)	\$0	\$0	\$0
Ending Balance	\$0	\$0	\$0
O&M ENDOWMENT			
Beginning Balance	\$64,984,775	\$65,315,873	\$65,656,903
Total Revenues	\$1,949,543	\$1,959,476	\$1,969,707
Drawdown on Endowment Fund	(\$1,618,446)	(\$1,618,446)	(\$1,618,446)
Balance Adjustments	\$0	\$0	\$0
Ending Balance	\$65,315,873	\$65,656,903	\$66,008,165
SUPPLEMENTAL ENDOWMENT			
Beginning Balance	\$133,114	\$133,114	\$133,114
Total Revenues	\$0	\$0	\$0
Total Expenditures	\$0	\$0	\$0
Ending Balance	\$133,114	\$133,114	\$133,114
Changed Circumstances Fund Balance	\$9,898,440	\$10,195,393	\$10,501,255

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Appendix C

U.S. Fish and Wildlife Service (USFWS)
Conservation Guidelines for the Valley
Elderberry Longhorn Beetle,
updated July 9, 1999.

United States Department of the Interior
Fish and Wildlife Service
Sacramento Fish and Wildlife Office
2800 Cottage Way, Room W-2605
Sacramento, California 95825

Conservation Guidelines for the Valley Elderberry Longhorn Beetle

Revised July 9, 1999

The following guidelines have been issued by the U.S. Fish and Wildlife Service (Service) to assist Federal agencies and non-federal project applicants needing incidental take authorization through a section 7 consultation or a section 10(a)(1)(B) permit in developing measures to avoid and minimize adverse effects on the valley elderberry longhorn beetle. The Service will revise these guidelines as needed in the future. The most recently issued version of these guidelines should be used in developing all projects and habitat restoration plans. The survey and monitoring procedures described below are designed to avoid any adverse effects to the valley elderberry longhorn beetle. Thus a recovery permit is not needed to survey for the beetle or its habitat or to monitor conservation areas. If you are interested in a recovery permit for research purposes please call the Service's Regional Office at (503) 231-2063.

Background Information

The valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*), was listed as a threatened species on August 8, 1980 (Federal Register 45: 52803-52807). This animal is fully protected under the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 et seq.). The valley elderberry longhorn beetle (beetle) is completely dependent on its host plant, elderberry (*Sambucus* species), which is a common component of the remaining riparian forests and adjacent upland habitats of California's Central Valley. Use of the elderberry by the beetle, a wood borer, is rarely apparent. Frequently, the only exterior evidence of the elderberry's use by the beetle is an exit hole created by the larva just prior to the pupal stage. The life cycle takes one or two years to complete. The animal spends most of its life in the larval stage, living within the stems of an elderberry plant. Adult emergence is from late March through June, about the same time the elderberry produces flowers. The adult stage is short-lived. Further information on the life history, ecology, behavior, and distribution of the beetle can be found in a report by Barr (1991) and the recovery plan for the beetle (USFWS 1984).

Surveys

Proposed project sites within the range of the valley elderberry longhorn beetle should be surveyed for the presence of the beetle and its elderberry host plant by a qualified biologist. The beetle's range extends throughout California's Central Valley and associated foothills from about the 3,000-foot elevation contour on the east and the watershed of the Central Valley on the west (Figure 1). All or portions of 31 counties are included: Alameda, Amador, Butte, Calaveras, Colusa, Contra Costa, El Dorado, Fresno, Glenn, Kern, Kings, Lake, Madera, Mariposa, Merced, Napa, Nevada, Placer, Sacramento, San Benito, San Joaquin, San Luis Obispo, Shasta, Solano, Stanislaus, Sutter, Tehama, Tulare, Tuolumne, Yolo, Yuba.

If elderberry plants with one or more stems measuring 1.0 inch or greater in diameter at ground level occur on or adjacent to the proposed project site, or are otherwise located where they may be directly or indirectly affected by the proposed action, minimization measures which include planting replacement habitat (conservation planting) are required (Table 1).

All elderberry shrubs with one or more stems measuring 1.0 inch or greater in diameter at ground level that occur on or adjacent to a proposed project site must be thoroughly searched for beetle exit holes (external evidence of beetle presence). In addition, all elderberry stems one inch or greater in diameter at ground level must be tallied by diameter size class (Table 1). As outlined in Table 1, the numbers of elderberry seedlings/cuttings and associated riparian native trees/shrubs to be planted as replacement habitat are determined by stem size class of affected elderberry shrubs, presence or absence of exit holes, and whether a proposed project lies in a riparian or non-riparian area.

Elderberry plants with no stems measuring 1.0 inch or greater in diameter at ground level are unlikely to be habitat for the beetle because of their small size and/or immaturity. Therefore, no minimization measures are required for removal of elderberry plants with no stems measuring 1.0 inch or greater in diameter at ground level with no exit holes. Surveys are valid for a period of two years.

Avoid and Protect Habitat Whenever Possible

Project sites that do not contain beetle habitat are preferred. If suitable habitat for the beetle occurs on the project site, or within close proximity where beetles will be affected by the project, these areas must be designated as avoidance areas and must be protected from disturbance during the construction and operation of the project. When possible, projects should be designed such that avoidance areas are connected with adjacent habitat to prevent fragmentation and isolation of beetle populations. Any beetle habitat that cannot be avoided as described below should be considered impacted and appropriate minimization measures should be proposed as described below.

Avoidance: Establishment and Maintenance of a Buffer Zone

Complete avoidance (i.e., no adverse effects) may be assumed when a 100-foot (or wider) buffer is established and maintained around elderberry plants containing stems measuring 1.0 inch or greater in diameter at ground level. Firebreaks may not be included in the buffer zone. In buffer areas construction-related disturbance should be minimized, and any damaged area should be promptly restored following construction. The Service must be consulted before any disturbances within the buffer area are considered. In addition, the Service must be provided with a map identifying the avoidance area and written details describing avoidance measures.

Protective Measures

1. Fence and flag all areas to be avoided during construction activities. In areas where encroachment on the 100-foot buffer has been approved by the Service, provide a minimum setback of at least 20 feet from the dripline of each elderberry plant.

2. Brief contractors on the need to avoid damaging the elderberry plants and the possible penalties for not complying with these requirements.
3. Erect signs every 50 feet along the edge of the avoidance area with the following information: "This area is habitat of the valley elderberry longhorn beetle, a threatened species, and must not be disturbed. This species is protected by the Endangered Species Act of 1973, as amended. Violators are subject to prosecution, fines, and imprisonment." The signs should be clearly readable from a distance of 20 feet, and must be maintained for the duration of construction.
4. Instruct work crews about the status of the beetle and the need to protect its elderberry host plant.

Restoration and Maintenance

Restore any damage done to the buffer area (area within 100 feet of elderberry plants) during construction. Provide erosion control and re-vegetate with appropriate native plants.

Buffer areas must continue to be protected after construction from adverse effects of the project. Measures such as fencing, signs, weeding, and trash removal are usually appropriate.

No insecticides, herbicides, fertilizers, or other chemicals that might harm the beetle or its host plant should be used in the buffer areas, or within 100 feet of any elderberry plant with one or more stems measuring 1.0 inch or greater in diameter at ground level.

The applicant must provide a written description of how the buffer areas are to be restored, protected, and maintained after construction is completed.

Mowing of grasses/ground cover may occur from July through April to reduce fire hazard. No mowing should occur within five (5) feet of elderberry plant stems. Mowing must be done in a manner that avoids damaging plants (e.g., stripping away bark through careless use of mowing/trimming equipment).

Transplant Elderberry Plants That Cannot Be Avoided

Elderberry plants must be transplanted if they can not be avoided by the proposed project. All elderberry plants with one or more stems measuring 1.0 inch or greater in diameter at ground level must be transplanted to a conservation area (see below). At the Service's discretion, a plant that is unlikely to survive transplantation because of poor condition or location, or a plant that would be extremely difficult to move because of access problems, may be exempted from transplantation. In cases where transplantation is not possible the minimization ratios in Table 1 may be increased to offset the additional habitat loss.

Trimming of elderberry plants (e.g., pruning along roadways, bike paths, or trails) with one or more stems 1.0 inch or greater in diameter at ground level, may result in take of beetles. Therefore, trimming is subject to appropriate minimization measures as outlined in Table 1.

1. Monitor. A qualified biologist (monitor) must be on-site for the duration of the transplanting of the elderberry plants to insure that no unauthorized take of the valley elderberry longhorn beetle occurs. If unauthorized take occurs, the monitor must have the authority to stop work until corrective measures have been completed. The monitor must immediately report any unauthorized take of the beetle or its habitat to the Service and to the California Department of Fish and Game.

2. Timing. Transplant elderberry plants when the plants are dormant, approximately November through the first two weeks in February, after they have lost their leaves. Transplanting during the non-growing season will reduce shock to the plant and increase transplantation success.

3. Transplanting Procedure.

a. Cut the plant back 3 to 6 feet from the ground or to 50 percent of its height (whichever is taller) by removing branches and stems above this height. The trunk and all stems measuring 1.0 inch or greater in diameter at ground level should be replanted. Any leaves remaining on the plant should be removed.

b. Excavate a hole of adequate size to receive the transplant.

c. Excavate the plant using a Vemeer spade, backhoe, front end loader, or other suitable equipment, taking as much of the root ball as possible, and replant immediately at the conservation area. Move the plant only by the root ball. If the plant is to be moved and transplanted off site, secure the root ball with wire and wrap it with burlap. Dampen the burlap with water, as necessary, to keep the root ball wet. Do not let the roots dry out. Care should be taken to ensure that the soil is not dislodged from around the roots of the transplant. If the site receiving the transplant does not have adequate soil moisture, pre-wet the soil a day or two before transplantation.

d. The planting area must be at least 1,800 square feet for each elderberry transplant. The root ball should be planted so that its top is level with the existing ground. Compact the soil sufficiently so that settlement does not occur. As many as five (5) additional elderberry plantings (cuttings or seedlings) and up to five (5) associated native species plantings (see below) may also be planted within the 1,800 square foot area with the transplant. The transplant and each new planting should have its own watering basin measuring at least three (3) feet in diameter. Watering basins should have a continuous berm measuring approximately eight (8) inches wide at the base and six (6) inches high.

e. Saturate the soil with water. Do not use fertilizers or other supplements or paint the tips of stems with pruning substances, as the effects of these compounds on the beetle are unknown.

f. Monitor to ascertain if additional watering is necessary. If the soil is sandy and well-drained, plants may need to be watered weekly or twice monthly. If the soil is clayey and poorly-drained, it may not be necessary to water after the initial saturation. However, most transplants require watering through the first summer. A drip watering system and timer is ideal. However, in situations where this is not possible, a water truck or other apparatus may be used.

Plant Additional Seedlings or Cuttings

Each elderberry stem measuring 1.0 inch or greater in diameter at ground level that is adversely affected (i.e., transplanted or destroyed) must be replaced, in the conservation area, with elderberry seedlings or cuttings at a ratio ranging from 1:1 to 8:1 (new plantings to affected stems). Minimization ratios are listed and explained in Table 1. Stock of either seedlings or cuttings should be obtained from local sources. Cuttings may be obtained from the plants to be transplanted if the project site is in the vicinity of the conservation area. If the Service determines that the elderberry plants on the proposed project site are unsuitable candidates for transplanting, the Service may allow the applicant to plant seedlings or cuttings at higher than the stated ratios in Table 1 for each elderberry plant that cannot be transplanted.

Plant Associated Native Species

Studies have found that the beetle is more abundant in dense native plant communities with a mature overstory and a mixed understory. Therefore, a mix of native plants associated with the elderberry plants at the project site or similar sites will be planted at ratios ranging from 1:1 to 2:1 [native tree/plant species to each elderberry seedling or cutting (see Table 1)]. These native plantings must be monitored with the same survival criteria used for the elderberry seedlings (see below). Stock of saplings, cuttings, and seedlings should be obtained from local sources. If the parent stock is obtained from a distance greater than one mile from the conservation area, approval by the Service of the native plant donor sites must be obtained prior to initiation of the revegetation work. Planting or seeding the conservation area with native herbaceous species is encouraged. Establishing native grasses and forbs may discourage unwanted non-native species from becoming established or persisting at the conservation area. Only stock from local sources should be used.

Examples

Example 1

The project will adversely affect beetle habitat on a vacant lot on the land side of a river levee. This levee now separates beetle habitat on the vacant lot from extant Great Valley Mixed Riparian Forest (Holland 1986) adjacent to the river. However, it is clear that the beetle habitat located on the vacant lot was part of a more extensive mixed riparian forest ecosystem extending farther from the river's edge prior to agricultural development and levee construction. Therefore, the beetle habitat on site is considered riparian. A total of two elderberry plants with at least one stem measuring 1.0 inch or greater in diameter at ground level will be affected by the proposed action. The two plants

have a total of 15 stems measuring over 1.0 inch. No exit holes were found on either plant. Ten of the stems are between 1.0 and 3.0 inches in diameter and five of the stems are greater than 5.0 inches in diameter. The conservation area is suited for riparian forest habitat. Associated natives adjacent to the conservation area are box elder (*Acer negundo californica*), walnut (*Juglans californica* var. *hindsii*), sycamore (*Platanus racemosa*), cottonwood (*Populus fremontii*), willow (*Salix gooddingii* and *S. laevigata*), white alder (*Alnus rhombifolia*), ash (*Fraxinus latifolia*), button willow (*Cephalanthus occidentalis*), and wild grape (*Vitis californica*).

Minimization (based on ratios in Table 1):

- Transplant the two elderberry plants that will be affected to the conservation area.
- Plant 40 elderberry rooted cuttings (10 affected stems compensated at 2:1 ratio and 5 affected stems compensated at 4:1 ratio, cuttings planted:stems affected)
- Plant 40 associated native species (ratio of associated natives to elderberry plantings is 1:1 in areas with no exit holes):

5 saplings each of box elder, sycamore, and cottonwood

5 willow seedlings

5 white alder seedlings

5 saplings each of walnut and ash

3 California button willow

2 wild grape vines

Total: 40 associated native species

- Total area required is a minimum of 1,800 sq. ft. for one to five elderberry seedlings and up to 5 associated natives. Since, a total of 80 plants must be planted (40 elderberries and 40 associated natives), a total of 0.33 acre (14,400 square feet) will be required for conservation plantings. The conservation area will be seeded and planted with native grasses and forbs, and closely monitored and maintained throughout the monitoring period.

Example 2

The project will adversely affect beetle habitat in Blue Oak Woodland (Holland 1986). One elderberry plant with at least one stem measuring 1.0 inch or greater in diameter at ground level will be affected by the proposed action. The plant has a total of 10 stems measuring over 1.0 inch. Exit holes were found on the plant. Five of the stems are between 1.0 and 3.0 inches in diameter and five

of the stems are between 3.0 and 5.0 inches in diameter. The conservation area is suited for elderberry savanna (non-riparian habitat). Associated natives adjacent to the conservation area are willow (*Salix* species), blue oak (*Quercus douglasii*), interior live oak (*Q. wislizenii*), sycamore, poison oak (*Toxicodendron diversilobum*), and wild grape.

Minimization (based on ratios in Table 1):

- Transplant the one elderberry plant that will be affected to the conservation area.
- Plant 30 elderberry seedlings (5 affected stems compensated at 2:1 ratio and 5 affected stems compensated at 4:1 ratio, cuttings planted:stems affected)
- Plant 60 associated native species (ratio of associated natives to elderberry plantings is 2:1 in areas with exit holes):

20 saplings of blue oak, 20 saplings of sycamore, and 20 saplings of willow, and seed and plant with a mixture of native grasses and forbs

- Total area required is a minimum of 1,800 sq. ft. for one to five elderberry seedlings and up to 5 associated natives. Since, a total of 90 plants must be planted (30 elderberries and 60 associated natives), a total of 0.37 acre (16,200 square feet) will be required for conservation plantings. The conservation area will be seeded and planted with native grasses and forbs, and closely monitored and maintained throughout the monitoring period.

Conservation Area—Provide Habitat for the Beetle in Perpetuity

The conservation area is distinct from the avoidance area (though the two may adjoin), and serves to receive and protect the transplanted elderberry plants and the elderberry and other native plantings. The Service may accept proposals for off-site conservation areas where appropriate.

1. Size. The conservation area must provide at least 1,800 square feet for each transplanted elderberry plant. As many as 10 conservation plantings (i.e., elderberry cuttings or seedlings and/or associated native plants) may be planted within the 1800 square foot area with each transplanted elderberry. An additional 1,800 square feet shall be provided for every additional 10 conservation plants. Each planting should have its own watering basin measuring approximately three feet in diameter. Watering basins should be constructed with a continuous berm measuring approximately eight inches wide at the base and six inches high.

The planting density specified above is primarily for riparian forest habitats or other habitats with naturally dense cover. If the conservation area is an open habitat (i.e., elderberry savanna, oak woodland) more area may be needed for the required plantings. Contact the Service for assistance if the above planting recommendations are not appropriate for the proposed conservation area.

No area to be maintained as a firebreak may be counted as conservation area. Like the avoidance area, the conservation area should connect with adjacent habitat wherever possible, to prevent isolation of beetle populations.

Depending on adjacent land use, a buffer area may also be needed between the conservation area and the adjacent lands. For example, herbicides and pesticides are often used on orchards or vineyards. These chemicals may drift or runoff onto the conservation area if an adequate buffer area is not provided.

2. Long-Term Protection. The conservation area must be protected in perpetuity as habitat for the valley elderberry longhorn beetle. A conservation easement or deed restrictions to protect the conservation area must be arranged. Conservation areas may be transferred to a resource agency or appropriate private organization for long-term management. The Service must be provided with a map and written details identifying the conservation area; and the applicant must receive approval from the Service that the conservation area is acceptable prior to initiating the conservation program. A true, recorded copy of the deed transfer, conservation easement, or deed restrictions protecting the conservation area in perpetuity must be provided to the Service before project implementation.

Adequate funds must be provided to ensure that the conservation area is managed in perpetuity. The applicant must dedicate an endowment fund for this purpose, and designate the party or entity that will be responsible for long-term management of the conservation area. The Service must be provided with written documentation that funding and management of the conservation area (items 3-8 above) will be provided in perpetuity.

3. Weed Control. Weeds and other plants that are not native to the conservation area must be removed at least once a year, or at the discretion of the Service and the California Department of Fish and Game. Mechanical means should be used; herbicides are prohibited unless approved by the Service.

4. Pesticide and Toxicant Control. Measures must be taken to insure that no pesticides, herbicides, fertilizers, or other chemical agents enter the conservation area. No spraying of these agents must be done within one 100 feet of the area, or if they have the potential to drift, flow, or be washed into the area in the opinion of biologists or law enforcement personnel from the Service or the California Department of Fish and Game.

5. Litter Control. No dumping of trash or other material may occur within the conservation area. Any trash or other foreign material found deposited within the conservation area must be removed within 10 working days of discovery.

6. Fencing. Permanent fencing must be placed completely around the conservation area to prevent unauthorized entry by off-road vehicles, equestrians, and other parties that might damage or destroy the habitat of the beetle, unless approved by the Service. The applicant must receive written approval from the Service that the fencing is acceptable prior to initiation of the conservation program. The fence must be maintained in perpetuity, and must be

repaired/replaced within 10 working days if it is found to be damaged. Some conservation areas may be made available to the public for appropriate recreational and educational opportunities with written approval from the Service. In these cases appropriate fencing and signs informing the public of the beetle's threatened status and its natural history and ecology should be used and maintained in perpetuity.

7. Signs. A minimum of two prominent signs must be placed and maintained in perpetuity at the conservation area, unless otherwise approved by the Service. The signs should note that the site is habitat of the federally threatened valley elderberry longhorn beetle and, if appropriate, include information on the beetle's natural history and ecology. The signs must be approved by the Service. The signs must be repaired or replaced within 10 working days if they are found to be damaged or destroyed.

Monitoring

The population of valley elderberry longhorn beetles, the general condition of the conservation area, and the condition of the elderberry and associated native plantings in the conservation area must be monitored over a period of either ten (10) consecutive years or for seven (7) years over a 15-year period. The applicant may elect either 10 years of monitoring, with surveys and reports every year; or 15 years of monitoring, with surveys and reports on years 1, 2, 3, 5, 7, 10, and 15. The conservation plan provided by the applicant must state which monitoring schedule will be followed. No change in monitoring schedule will be accepted after the project is initiated. If conservation planting is done in stages (i.e., not all planting is implemented in the same time period), each stage of conservation planting will have a different start date for the required monitoring time.

Surveys. In any survey year, a minimum of two site visits between February 14 and June 30 of each year must be made by a qualified biologist. Surveys must include:

1. A population census of the adult beetles, including the number of beetles observed, their condition, behavior, and their precise locations. Visual counts must be used; mark-recapture or other methods involving handling or harassment must not be used.
2. A census of beetle exit holes in elderberry stems, noting their precise locations and estimated ages.
3. An evaluation of the elderberry plants and associated native plants on the site, and on the conservation area, if disjunct, including the number of plants, their size and condition.
4. An evaluation of the adequacy of the fencing, signs, and weed control efforts in the avoidance and conservation areas.
5. A general assessment of the habitat, including any real or potential threats to the beetle and its host plants, such as erosion, fire, excessive grazing, off-road vehicle use, vandalism, excessive weed growth, etc.

The materials and methods to be used in the monitoring studies must be reviewed and approved by the Service. All appropriate Federal permits must be obtained prior to initiating the field studies.

Reports. A written report, presenting and analyzing the data from the project monitoring, must be prepared by a qualified biologist in each of the years in which a monitoring survey is required. Copies of the report must be submitted by December 31 of the same year to the Service (Chief of Endangered Species, Sacramento Fish and Wildlife Office), and the Department of Fish and Game (Supervisor, Environmental Services, Department of Fish and Game, 1416 Ninth Street, Sacramento, California 95814; and Staff Zoologist, California Natural Diversity Data Base, Department of Fish and Game, 1220 S Street, Sacramento, California 95814). The report must explicitly address the status and progress of the transplanted and planted elderberry and associated native plants and trees, as well as any failings of the conservation plan and the steps taken to correct them. Any observations of beetles or fresh exit holes must be noted. Copies of original field notes, raw data, and photographs of the conservation area must be included with the report. A vicinity map of the site and maps showing where the individual adult beetles and exit holes were observed must be included. For the elderberry and associated native plants, the survival rate, condition, and size of the plants must be analyzed. Real and likely future threats must be addressed along with suggested remedies and preventative measures (e.g. limiting public access, more frequent removal of invasive non-native vegetation, etc.).

A copy of each monitoring report, along with the original field notes, photographs, correspondence, and all other pertinent material, should be deposited at the California Academy of Sciences (Librarian, California Academy of Sciences, Golden Gate Park, San Francisco, CA 94118) by December 31 of the year that monitoring is done and the report is prepared. The Service's Sacramento Fish and Wildlife Office should be provided with a copy of the receipt from the Academy library acknowledging receipt of the material, or the library catalog number assigned to it.

Access. Biologists and law enforcement personnel from the California Department of Fish and Game and the Service must be given complete access to the project site to monitor transplanting activities. Personnel from both these agencies must be given complete access to the project and the conservation area to monitor the beetle and its habitat in perpetuity.

Success Criteria

A minimum survival rate of at least 60 percent of the elderberry plants and 60 percent of the associated native plants must be maintained throughout the monitoring period. Within one year of discovery that survival has dropped below 60 percent, the applicant must replace failed plantings to bring survival above this level. The Service will make any determination as to the applicant's replacement responsibilities arising from circumstances beyond its control, such as plants damaged or killed as a result of severe flooding or vandalism.

Service Contact

These guidelines were prepared by the Endangered Species Division of the Service's Sacramento Fish and Wildlife Office. If you have questions regarding these guidelines or to request a copy of the most recent guidelines, telephone (916) 414-6600, or write to:

U.S. Fish and Wildlife Service
 Ecological Services
 2800 Cottage Way, W-2605
 Sacramento, CA 95825

Literature Cited

Barr, C. B. 1991. The distribution, habitat, and status of the valley elderberry longhorn beetle *Desmocerus californicus dimorphus*. U.S. Fish and Wildlife Service; Sacramento, California.

Holland, R.F. 1986. Preliminary descriptions of the terrestrial natural communities of California. Unpublished Report. State of California, The Resources Agency, Department of Fish and Game, Natural Heritage Division, Sacramento, California.

USFWS. 1980. Listing the valley elderberry longhorn beetle as a threatened species with critical habitat. Federal Register 45:52803-52807.

USFWS. 1984. Recovery plan for the valley elderberry longhorn beetle. U.S. Fish and Wildlife Service, Endangered Species Program; Portland, Oregon.

Table 1: Minimization ratios based on location (riparian vs. non-riparian), stem diameter of affected elderberry plants at ground level, and presence or absence of exit holes.

Location	Stems (maximum diameter at ground level)	Exit Holes on Shrub Y/N (quantify) 1	Elderberry Seedling Ratio ²	Associated Native Plant Ratio ³
non-riparian	stems $\geq 1"$ & $\leq 3"$	No:	1:1	1:1
		Yes:	2:1	2:1
non-riparian	stems $> 3"$ & $< 5"$	No:	2:1	1:1
		Yes:	4:1	2:1
non-riparian	stems $\geq 5"$	No:	3:1	1:1
		Yes:	6:1	2:1
riparian	stems $\geq 1"$ & $\leq 3"$	No:	2:1	1:1
		Yes:	4:1	2:1
riparian	stems $> 3"$ & $< 5"$	No:	3:1	1:1

		Yes:	6:1	2:1
riparian	stems $\geq 5"$	No:	4:1	1:1
		Yes:	8:1	2:1

¹ All stems measuring one inch or greater in diameter at ground level on a single shrub are considered occupied when exit holes are present anywhere on the shrub.

² Ratios in the Elderberry Seedling Ratio column correspond to the number of cuttings or seedlings to be planted per elderberry stem (one inch or greater in diameter at ground level) affected by a project.

³ Ratios in the Associated Native Plant Ratio column correspond to the number of associated native species to be planted per elderberry (seedling or cutting) planted.



[Click for range map](#)

Endangered Species Div., Sacramento Fish & Wildlife Office, U.S. Fish & Wildlife Service

Appendix D

California Department of Fish and
Game Staff Report on Burrowing Owl
Mitigation,
dated October 17, 1995.

STAFF REPORT ON BURROWING OWL MITIGATION

Introduction

The Legislature and the Fish and Game Commission have developed the policies, standards and regulatory mandates to protect native species of fish and wildlife. In order to determine how the Department of Fish and Game (Department) could judge the adequacy of mitigation measures designed to offset impacts to burrowing owls (*Speotyto cunicularia*; A.O.U. 1991) staff (WMD, ESD, and Regions) has prepared this report. To ensure compliance with legislative and commission policy, mitigation requirements which are consistent with this report should be incorporated into: (1) Department comments to Lead Agencies and project sponsors pursuant to the California Environmental Quality Act (CEQA); and (2) other authorizations the Department gives to project proponents for projects impacting burrowing owls.

This report is designed to provide the Department (including regional offices and divisions), CEQA Lead Agencies and project proponents the context in which the Environmental Services Division (ESD) will review proposed project specific mitigation measures. This report also includes preapproved mitigation measures which have been judged to be consistent with policies, standards and legal mandates of the Legislature, the Fish and Game Commission and the Department's public trust responsibilities. Implementation of mitigation measures consistent with this report are intended to help achieve the conservation of burrowing owls and should compliment multi-species habitat conservation planning efforts currently underway. The *Burrowing Owl Survey Protocol and Mitigation Guidelines* developed by The California Burrowing Owl Consortium (CBOC 1993) were taken into consideration in the preparation of this staff report as were comments from other interested parties.

A range-wide conservation strategy for this species is needed. Any range-wide conservation strategy should establish criteria for avoiding the need to list the species pursuant to either the California or federal Endangered Species Acts through preservation of existing habitat, population expansion into former habitat, recruitment of young into the population, and other specific efforts.

California's burrowing owl population is clearly declining and, if declines continue, the species may qualify for listing. Because of the intense pressure for urban development within suitable burrowing owl nesting and foraging habitat (open, flat and gently rolling grasslands and grass/shrub lands) in California, conflicts between owls and development projects often occur. Owl survival can be adversely affected by disturbance and foraging habitat loss even when impacts to individual birds and nests/burrows are avoided. Adequate information about the presence of owls is often unavailable prior to project approval. Following project approval there is no legal mechanism through which to seek mitigation other than avoidance of occupied burrows or nests. The absence of standardized survey methods often impedes consistent impact assessment.

Burrowing Owl Habitat Description

Burrowing owl habitat can be found in annual and perennial grasslands, deserts, and arid scrublands characterized by low-growing vegetation (Zarn 1974). Suitable owl habitat may also include trees and shrubs if the canopy covers less than 30 percent of the ground surface. Burrows are the essential component of burrowing owl habitat. Both natural and artificial burrows provide protection, shelter, and nests for burrowing owls (Henny and Blus 1981). Burrowing owls typically use burrows made by fossorial mammals, such as ground squirrels or badgers, but also may use man-made structures such as cement culverts; cement, asphalt, or wood debris piles; or openings beneath cement or asphalt pavement.

Occupied Burrowing Owl Habitat

Burrowing owls may use a site for breeding, wintering, foraging, and/or migration stopovers. Occupancy of suitable burrowing owl habitat can be verified at a site by detecting a burrowing owl, its molted feathers, cast pellets, prey remains, eggshell fragments, or excrement at or near a burrow entrance. Burrowing owls exhibit high site fidelity, reusing burrows year after year (Rich 1984, Feeny 1992). A site should be assumed occupied if at least one burrowing owl has been observed occupying a burrow there within the last three years (Rich 1984).

CEQA Project Review

The measures included in this report are intended to provide a decision-making process that should be implemented whenever there is potential for an action or project to adversely affect burrowing owls. For projects subject to the California Environmental Quality Act (CEQA), the process begins by conducting surveys to determine if burrowing owls are foraging or nesting on or adjacent to the project site. If surveys confirm that the site is occupied habitat, mitigation measures to minimize impacts to burrowing owls, their burrows and foraging habitat should be incorporated into the CEQA document as enforceable conditions. The measures in this document are intended to conserve the species by protecting and maintaining viable populations of the species throughout their range in California. This may often result in protecting and managing habitat for the species at sites away from rapidly urbanizing/developing areas. Projects and situations vary and mitigation measures should be adapted to fit specific circumstances.

Projects not subject to CEQA review may have to be handled separately since the legal authority the Department has with respect to burrowing owls in this type of situation is often limited. The burrowing owl is protected from "take" (Section 3503.5 of the Fish and Game Code) but unoccupied habitat is likely to be lost for activities not subject to CEQA.

Legal Status

The burrowing owl is a migratory species protected by international treaty under the Migratory Bird Treaty Act (MBTA) of 1918 (16 U.S.C. 703-711). The MBTA makes it unlawful to take, possess, buy, sell, purchase, or barter any migratory bird listed in 50 C.F.R. Part 10, including feathers or other parts, nests, eggs, or products, except as allowed by implementing regulations (50 C.F.R. 21). Sections 3505, 3503.5, and 3800 of the California Department of Fish and Game Code prohibit the take, possession, or destruction of birds, their nests or eggs. To avoid violation of the take provisions of these laws generally requires that project-related disturbance at active nesting territories be reduced or eliminated during the nesting cycle (February 1 to August 31). Disturbance that causes nest abandonment and/or loss of reproductive effort (e.g., killing or abandonment of eggs or young) may be considered "take" and is potentially punishable by fines and/or imprisonment.

The burrowing owl is a Species of Special Concern to California because of declines of suitable habitat and both localized and statewide population declines. Guidelines for the Implementation of the California Environmental Quality Act (CEQA) provide that a species be considered as endangered or "rare" regardless of appearance on a formal list for the purposes of the CEQA (Guidelines, Section 15380, subsections b and d). The CEQA requires a mandatory findings of significance if impacts to threatened or endangered species are likely to occur (Sections 21001 {c}, 2103; Guidelines 15380, 15064, 15065). To be legally adequate, mitigation measures must be capable of "avoiding the impact altogether by not taking a certain action or parts of an action"; "minimizing impacts by limiting the degree or magnitude of the action and its implementation"; "rectifying the impact by repairing, rehabilitating or restoring the impacted environment"; "or reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action" (Guidelines, Section 15370). Avoidance or mitigation to reduce impacts to less than significant levels must be included in a project or the CEQA lead agency must make and justify findings of overriding considerations.

Impact Assessment

Habitat Assessment

The project site and a 150 meter (approximately 500 ft.) buffer (where possible and appropriate based on habitat) should be surveyed to assess the presence of burrowing owls and their habitat (Thomsen 1971, Martin 1973). If occupied habitat is detected on or adjacent to the site, measures to avoid, minimize, or mitigate the project's impacts to the species should be incorporated into the project, including burrow preconstruction surveys to ensure avoidance of direct take. It is also recommended that preconstruction surveys be conducted if the species was not detected but is likely to occur on the project site.

Burrowing Owl and Burrow Surveys

Burrowing owl and burrow surveys should be conducted during both the wintering and nesting seasons, unless the species is detected on the first survey. If possible, the winter survey should be conducted between December 1 and January 31 (when wintering owls are most likely to be present) and the nesting season survey should be conducted between April 15 and July 15 (the peak of the breeding season). Surveys conducted from two hours before sunset to one hour after, or from one hour before to two hours after sunrise, are also preferable.

Surveys should be conducted by walking suitable habitat on the entire project site and (where possible) in areas within 150 meters (approx. 500 ft.) of the project impact zone. The 150-meter buffer zone is surveyed to identify burrows and owls outside of the project area which may be impacted by factors such as noise and vibration (heavy equipment, etc.) during project construction. Pedestrian survey transects should be spaced to allow 100 percent visual coverage of the ground surface. The distance between transect center lines should be no more than 30 meters (approx. 100 ft.) and should be reduced to account for differences in terrain, vegetation density, and ground surface visibility. To effectively survey large projects (100 acres or larger), two or more surveyors should be used to walk adjacent transects. To avoid impacts to owls from surveyors, owls and/or occupied burrows should be avoided by a minimum of 50 meters (approx. 160 ft.) wherever practical. Disturbance to occupied burrows should be avoided during all seasons.

Definition of Impacts

The following should be considered impacts to the species:

- Disturbance within 50 meters (approx. 160 ft.) Which may result in harassment of owls at occupied burrows;
- Destruction of natural and artificial burrows (culverts, concrete slabs and debris piles that provide shelter to burrowing owls); and
- Destruction and/or degradation of foraging habitat adjacent (within 100 m) of an occupied burrow(s).

Written Report

A report for the project should be prepared for the Department and copies should be submitted to the Regional contact and to the Wildlife Management Division Bird and Mammal Conservation Program. The report should include the following information:

- Date and time of visit(s) including name of the qualified biologist conducting surveys, weather and visibility conditions, and survey methodology;
- Description of the site including location, size, topography, vegetation communities, and animals observed during visit(s);
- Assessment of habitat suitability for burrowing owls;
- Map and photographs of the site;
- Results of transect surveys including a map showing the location of all burrow(s) (natural or artificial) and owl(s), including the numbers at each burrow if present and tracks, feathers, pellets, or other items (prey remains, animal scat);
- Behavior of owls during the surveys;
- Summary of both winter and nesting season surveys including any productivity information and a map showing territorial boundaries and home ranges; and
- Any historical information (Natural Diversity Database, Department regional files, Breeding Bird Survey data, American Birds records, Audubon Society, local bird club, other biologists, etc.) regarding the presence of burrowing owls on the site.

Mitigation

The objective of these measures is to avoid and minimize impacts to burrowing owls at a project site and preserve habitat that will support viable owls populations. If burrowing owls are detected using the project area, mitigation measures to minimize and offset the potential impacts should be included as enforceable measures during the CEQA process.

Mitigation actions should be carried out from September 1 to January 31 which is prior to the nesting season (Thomsen 1971, Zarn 1974). Since the timing of nesting activity may vary with latitude and climatic conditions, this time frame should be adjusted accordingly. Preconstruction surveys of suitable habitat at the project site(s) and buffer zone(s) should be conducted within the 30 days prior to construction to ensure no additional burrowing owls have established territories since the initial surveys. If ground disturbing activities are delayed or suspended for more than 30 days after the preconstruction survey, the site should be resurveyed.

Although the mitigation measures may be included as enforceable project conditions in the CEQA process, it may also be desirable to formalize them in a Memorandum of Understanding (MOU) between the Department and the project sponsor. An MOU is needed when lands (fee title or conservation easement) are being transferred to the Department.

Specific Mitigation Measures

1. Occupied burrows should not be disturbed during the nesting season (February 1 through August 31) unless a qualified biologist approved by the Department verifies through non-invasive methods that either: (1) the birds have not begun egg-laying and incubation; or (2) that juveniles from the occupied burrows are foraging independently and are capable of independent survival.
2. To offset the loss of foraging and burrow habitat on the project site, a minimum of 6.5 acres of foraging habitat (calculated on a 100 m {approx. 300 ft.} foraging radius around the burrow) per pair or unpaired resident bird, should be acquired and permanently protected. The protected lands should be adjacent to occupied burrowing owl habitat and at a location acceptable to the Department. *Protection of additional habitat acreage per pair or unpaired resident bird may be applicable in some instances.* The CBOC has also developed mitigation guidelines (CBOC 1993) that can be incorporated by CEQA lead agencies and which are consistent with this staff report.
3. When destruction of occupied burrows is unavoidable, existing unsuitable burrows should be enhanced (enlarged or cleared of debris) or new burrows created (by installing artificial burrows) at a ratio of 2:1 on the protected lands site. One example of an artificial burrow design is provided in Attachment A.
4. If owls must be moved away from the disturbance area, passive relocation techniques (as described below) should be used rather than trapping. At least one or more weeks will be necessary to accomplish this and allow the owls to acclimate to alternate burrows.
5. The project sponsor should provide funding for long-term management and monitoring of the protected lands. The monitoring plan should include success criteria, remedial measures, and an annual report to the Department.

Impact Avoidance

If avoidance is the preferred method of dealing with potential project impacts, then no disturbance should occur within 50 meters (approx. 160 ft.) of occupied burrows during the nonbreeding season of September 1 through January 31 or within 75 meters (approx. 250 ft.) during the breeding season of February 1 through August 31. Avoidance also requires that a minimum of 6.5 acres of foraging habitat be *permanently* preserved contiguous with occupied burrow sites for each pair of breeding burrowing owls (with or without dependent young) or single unpaired resident bird. The configuration of the protected habitat should be approved by the Department.

Passive Relocation - With One-Way Doors

Owls should be excluded from burrows in the immediate impact zone and within a 50 meter (approx. 160 ft.) buffer zone by installing one-way doors in burrow entrances. One-way doors (e.g., modified dryer vents) should be left in place 48 hours to insure owls have left the burrow before excavation. Two natural or artificial burrows should be provided for each burrow in the project area that will be rendered biologically unsuitable. The project area should be *monitored daily for one week* to confirm owl use of burrows before excavating burrows in the immediate impact zone. Whenever possible, burrows should be excavated using hand tools and refilled to prevent reoccupation. Sections of flexible plastic pipe should be inserted into the tunnels during excavation to maintain an escape route for any animals inside the burrow.

Passive Relocation - Without One-Way Doors

Two natural or artificial burrows should be provided for each burrow in the project area that will be rendered biologically unsuitable. The project area should be *monitored daily until the owls have relocated to the new burrows*. The formerly occupied burrows may then be excavated. Whenever possible, burrows should be excavated using hand tools and refilled to prevent reoccupation. Sections of flexible plastic pipe should be inserted into burrows during excavation to maintain an escape route for any animals inside the burrow.

Projects Not Subject to CEQA

The Department is often contacted regarding the presence of burrowing owls on construction sites, parking lots and other areas for which there is no CEQA action or for which the CEQA process has been completed. In these situations, the Department should seek to reach agreement with the project sponsor to implement the specific mitigation measures described above. If they are unwilling to do so, passive relocation without the aid of one-way doors is their only option based upon Fish and Game Code 3503.5.

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Reproductive Success of Burrowing Owls Using Artificial Nest Burrows in Southeastern Idaho

by Bruce Olenick

Artificial nest burrows were implanted in southeastern Idaho for burrowing owls in the spring of 1986. These artificial burrows consisted of a 12" X 12" X 8" wood nesting chamber with removable top and a 6 foot corrugated and perforated plastic drainage pipe 6 inches in diameter (Fig. 1). Earlier investigators claimed that artificial burrows must provide a natural dirt floor to allow burrowing owls to modify the nesting tunnel and chamber. Contrary to this, the artificial burrow introduced here does not allow owls to modify the entrance or tunnel. The inability to change the physical dimensions of the burrow tunnel does not seem to affect the owls' breeding success or deter them from using this burrow design.

In 1986, 22 artificial burrows were inhabited. Thirteen nesting attempts yielded an average clutch size of 8.3 eggs per breeding pair. Eight nests successfully hatched at least 1 nestling. In these nests, 67 of 75 eggs hatched (89.3%) and an estimated 61 nestlings (91.0%) fledged. An analysis of the egg laying and incubation periods showed that incubation commenced well after egg lay-

ing began. Average clutch size at the start of incubation was 5.6 eggs. Most eggs tended to hatch synchronously in all successful nests.

Although the initial cost of constructing this burrow design may be slightly higher than a burrow consisting entirely of wood, the plastic pipe burrow offers the following advantages: (1) it lasts several field seasons without rotting or collapsing; (2) it may prevent or retard predation; (3) construction time is min-

imal; (4) it is easy to transport, especially over long distances; and (5) the flexible tunnel simplifies installation. The use of this artificial nest burrow design was highly successful and may prove to be a great resource technique for future management of this species.

For additional information on constructing this artificial nest burrow, contact Bruce Olenick, Department of Biology, Idaho State University, Pocatello, ID 83209.

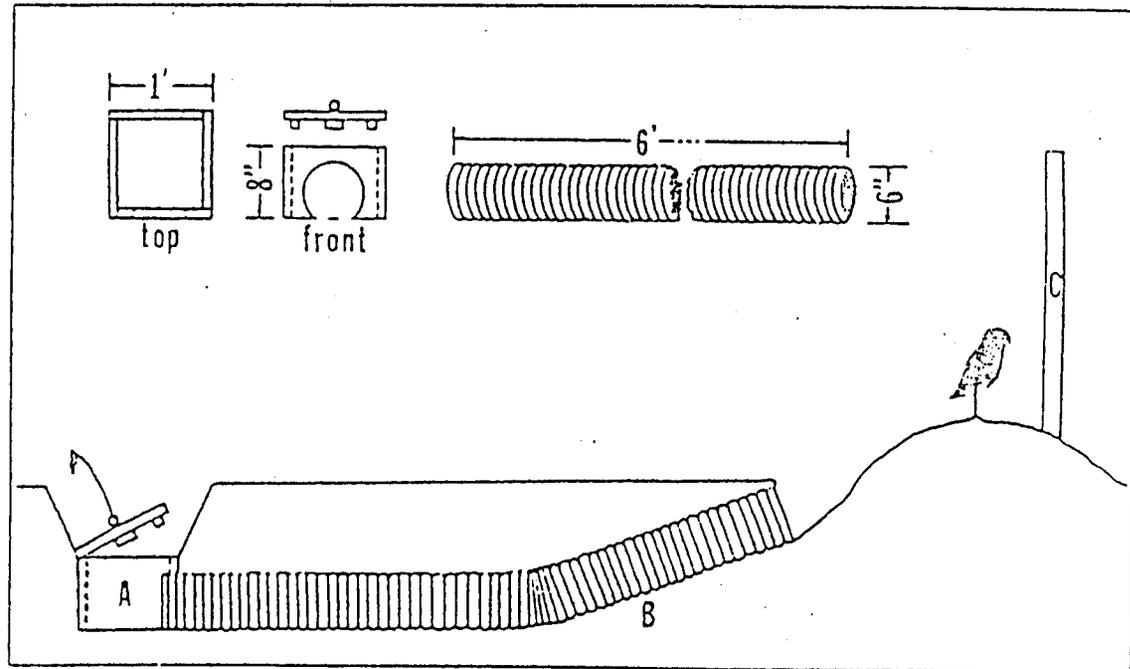


Fig. 1 Artificial nest burrow design for burrowing owls. Entire unit (including nest chamber) is buried 12"-18" below ground for maintaining thermal stability of the nest chamber. A = nest chamber, B = plastic pipe. C = perch.

Appendix E

Federal Aviation Administration
Advisory Circular, Hazardous Wildlife
Attractants On or Near Airports, dated
May 1, 1997.



U.S. Department of Transportation

Federal Aviation Administration

Advisory Circular

ADVANCE COPY
APPROVED FOR USE

Subject: HAZARDOUS WILDLIFE ATTRACTANTS ON OR NEAR AIRPORTS

Date: 5/1/97

AC No: 150/5200-35

Initiated by:

Change:

AAS-310 and APP-600

1. **PURPOSE.** This advisory circular (AC) provides guidance on locating certain land uses having the potential to attract hazardous wildlife to or in the vicinity of public-use airports. It also provides guidance concerning the placement of new airport development projects (including airport construction, expansion, and renovation) pertaining to aircraft movement in the vicinity of hazardous wildlife attractants. Appendix 1 provides definitions of terms used in this AC.

2. **APPLICATION.** The standards, practices, and suggestions contained in this AC are recommended by the Federal Aviation Administration (FAA) for use by the operators and sponsors of all public-use airports. In addition, the standards, practices, and suggestions contained in this AC are recommended by the FAA as guidance for land use planners, operators, and developers of projects, facilities, and activities on or near airports.

3. **BACKGROUND.** Populations of many species of wildlife have increased markedly in the

last few years. Some of these species are able to adapt to human-made environments, such as exist on and around airports. The increase in wildlife populations, the use of larger turbine engines, the increased use of twin-engine aircraft, and the increase in air-traffic, all combine to increase the risk, frequency, and potential severity of wildlife-aircraft collisions.

Most public-use airports have large tracts of open, unimproved land that are desirable for added margins of safety and noise mitigation. These areas can present potential hazards to aviation because they often attract hazardous wildlife. During the past century, wildlife-aircraft strikes have resulted in the loss of hundreds of lives world-wide, as well as billions of dollars worth of aircraft damage. Hazardous wildlife attractants near airports could jeopardize future airport expansion because of safety considerations.

DAVID L. BENNETT
Director, Office of Airport Safety and Standards

SECTION 1. HAZARDOUS WILDLIFE ATTRACTANTS ON OR NEAR AIRPORTS.

1-1. TYPES OF HAZARDOUS WILDLIFE ATTRACTANTS ON OR NEAR AIRPORTS. Human-made or natural areas, such as poorly-drained areas, retention ponds, roosting habitats on buildings, landscaping, putrescible-waste disposal operations, wastewater treatment plants, agricultural or aquacultural activities, surface mining, or wetlands, may be used by wildlife for escape, feeding, loafing, or reproduction. Wildlife use of areas within an airport's approach or departure airspace, aircraft movement areas, loading ramps, or aircraft parking areas may cause conditions hazardous to aircraft safety.

All species of wildlife can pose a threat to aircraft safety. However, some species are more commonly involved in aircraft strikes than others. Table 1 lists the wildlife groups commonly reported as being involved in damaging strikes to U.S. aircraft from 1993 to 1995.

Table 1. Wildlife Groups Involved in Damaging Strikes to Civilian Aircraft, USA, 1993-1995.

Wildlife Groups	Percent involvement in reported damaging strikes
Gulls	28
Waterfowl	23
Raptors	11
Doves	6
Vultures	5
Blackbirds-	5
Starlings	
Corvids	3
Wading birds	3
Deer	11
Canids	1

1-2. LAND USE PRACTICES. Land use practices that attract or sustain hazardous wildlife populations on or near airports can significantly increase the potential for wildlife-aircraft collisions. FAA recommends against land use practices, within the siting criteria stated in 1-3, that attract or sustain populations of hazardous wildlife within the vicinity of airports or cause movement of hazardous wildlife onto, into, or across the approach or departure airspace, aircraft movement area, loading ramps, or aircraft parking area of airports.

Airport operators, sponsors, planners, and land use developers should consider whether proposed land uses, including new airport development projects, would increase the wildlife hazard. Caution should be exercised to ensure that land use practices on or near airports do not enhance the attractiveness of the area to hazardous wildlife.

1-3. SITING CRITERIA. FAA recommends separations when siting any of the wildlife attractants mentioned in Section 2 or when planning new airport development projects to accommodate aircraft movement. The distance between an airport's aircraft movement areas, loading ramps, or aircraft parking areas and the wildlife attractant should be as follows:

a. Airports serving piston-powered aircraft. A distance of 5,000 feet is recommended.

b. Airports serving turbine-powered aircraft. A distance of 10,000 feet is recommended.

c. Approach or Departure airspace. A distance of 5 statute miles is recommended, if the wildlife attractant may cause hazardous wildlife movement into or across the approach or departure airspace.

SECTION 2. LAND USES THAT ARE INCOMPATIBLE WITH SAFE AIRPORT OPERATIONS.

2-1. GENERAL. The wildlife species and the size of the populations attracted to the airport environment are highly variable and may depend on several factors, including land-use practices on or near the airport. It is important to identify those land use practices in the airport area that attract hazardous wildlife. This section discusses land use practices known to threaten aviation safety.

2-2. PUTRESCIBLE-WASTE DISPOSAL OPERATIONS. Putrescible-waste disposal operations are known to attract large numbers of wildlife that are hazardous to aircraft. Because of this, these operations, when located within the separations identified in the siting criteria in 1-3 are considered incompatible with safe airport operations.

FAA recommends against locating putrescible-waste disposal operations inside the separations identified in the siting criteria mentioned above. FAA also recommends against new airport development projects that would increase the number of aircraft operations or that would accommodate larger or faster aircraft, near putrescible-waste disposal operations located within the separations identified in the siting criteria in 1-3.

2-3. WASTEWATER TREATMENT FACILITIES. Wastewater treatment facilities and associated settling ponds often attract large numbers of wildlife that can pose a threat to aircraft safety when they are located on or near an airport.

a. New wastewater treatment facilities. FAA recommends against the construction of new wastewater treatment facilities or associated settling ponds within the separations identified in the siting criteria in 1-3. During the siting analysis for wastewater treatment facilities, the potential to attract hazardous wildlife should be considered if an airport is in the vicinity of a proposed site. Airport operators should voice their opposition to such sitings. In addition, they should consider the existence of wastewater treatment facilities when evaluating proposed sites for new airport development projects and avoid such sites when practicable.

b. Existing wastewater treatment facilities. FAA recommends correcting any wildlife hazards arising from existing wastewater treatment facilities located on or near airports without delay, using appropriate wildlife hazard mitigation techniques. Accordingly, measures to minimize hazardous wildlife attraction should be developed in consultation with a wildlife damage management biologist. FAA recommends that wastewater treatment facility operators incorporate appropriate wildlife hazard mitigation techniques into their operating practices. Airport operators also should encourage those operators to incorporate these mitigation techniques in their operating practices.

c. Artificial marshes. Waste-water treatment facilities may create artificial marshes and use submergent and emergent aquatic vegetation as natural filters. These artificial marshes may be used by some species of flocking birds, such as blackbirds and waterfowl, for breeding or roosting activities. FAA recommends against establishing artificial marshes within the separations identified in the siting criteria stated in 1-3.

d. Wastewater discharge and sludge disposal. FAA recommends against the discharge of wastewater or sludge on airport property. Regular spraying of wastewater or sludge disposal on unpaved areas may improve soil moisture and quality. The resultant turf growth requires more frequent mowing, which in turn may mutilate or flush insects or small animals and produce straw. The matted or flushed organisms and the straw can attract hazardous wildlife and jeopardize aviation safety. In addition, the improved turf may attract grazing wildlife such as deer and geese.

Problems may also occur when discharges saturate unpaved airport areas. The resultant soft, muddy conditions can severely restrict or prevent emergency vehicles from reaching accident sites in a timely manner.

e. Underwater waste discharges. The underwater discharge of any food waste, e.g., fish processing offal, that could attract scavenging wildlife is not recommended within the separations identified in the siting criteria in 1-3.

2-4. WETLANDS.

a. Wetlands on or near Airports.

(1) Existing Airports. Normally, wetlands are attractive to many wildlife species. Airport operators with wetlands located on or nearby airport property should be alert to any wildlife use or habitat changes in these areas that could affect safe aircraft operations.

(2) Airport Development. When practicable, the FAA recommends siting new airports using the separations identified in the siting criteria in 1-3. Where alternative sites are not practicable or when expanding existing airports in or near wetlands, the wildlife hazards should be evaluated and minimized through a wildlife management plan prepared by a wildlife damage management biologist, in consultation with the U.S. Fish and Wildlife Service (USFWS) and the U.S. Army Corps of Engineers (COE).

NOTE: If questions exist as to whether or not an area would qualify as a wetland, contact the U.S. Army COE, the Natural Resource Conservation Service, or a wetland consultant certified to delineate wetlands.

b. Wetland mitigation. Mitigation may be necessary when unavoidable wetland disturbances result from new airport development projects. Wetland mitigation should be designed so it does not create a wildlife hazard.

(1) FAA recommends that wetland mitigation projects that may attract hazardous wildlife be sited outside of the separations

identified in the siting criteria in 1-3. Wetland mitigation banks meeting these siting criteria offer an ecologically sound approach to mitigation in these situations.

(2) Exceptions to locating mitigation activities outside the separations identified in the siting criteria in 1-3 may be considered if the affected wetlands provide unique ecological functions, such as critical habitat for threatened or endangered species or ground water recharge. Such mitigation must be compatible with safe airport operations. Enhancing such mitigation areas to attract hazardous wildlife should be avoided. On-site mitigation plans may be reviewed by the FAA to determine compatibility with safe airport operations.

(3) Wetland mitigation projects that are needed to protect unique wetland functions (see 2-4.b.(2)), and that must be located in the siting criteria in 1-3 should be identified and evaluated by a wildlife damage management biologist before implementing the mitigation. A wildlife damage management plan should be developed to reduce the wildlife hazards.

NOTE: AC 150/5000-3, *Address List for Regional Airports, Division and Airports District/Field Offices*, provides information on the location of these offices.

2-5. DREDGE SPOIL CONTAINMENT AREAS. FAA recommends against locating dredge spoil containment areas within the separations identified in the siting criteria in 1-3, if the spoil contains material that would attract hazardous wildlife.

5/1/97

SECTION 3. LAND USES THAT MAY BE COMPATIBLE WITH SAFE AIRPORT OPERATIONS.

3-1. GENERAL. Even though they may, under certain circumstances, attract hazardous wildlife, the land use practices discussed in this section have flexibility regarding their location or operation and may even be under the airport operator's or sponsor's control. In general, the FAA does not consider the activities discussed below as hazardous to aviation if there is no apparent attraction to hazardous wildlife, or wildlife hazard mitigation techniques are implemented to deal effectively with any wildlife hazard that may arise.

3-2. ENCLOSED WASTE FACILITIES. Enclosed trash transfer stations or enclosed waste handling facilities that receive garbage indoors; process it via compaction, incineration, or similar manner; and remove all residue by enclosed vehicles, generally would be compatible, from a wildlife perspective, with safe airport operations, provided they are not located on airport property or within the runway protection zone (RPZ). No putrescible-waste should be handled or stored outside at any time, for any reason, or in a partially enclosed structure accessible to hazardous wildlife.

Partially enclosed operations that accept putrescible-waste are considered to be incompatible with safe airport operations. FAA recommends these operations occur outside the separations identified in the siting criteria in 1-3.

3-3. RECYCLING CENTERS. Recycling centers that accept previously sorted, non-food items such as glass, newspaper, cardboard, or aluminum are, in most cases, not attractive to hazardous wildlife.

3-4. COMPOSTING OPERATIONS ON AIRPORTS. FAA recommends against locating composting operations on airports. However, when they are located on an airport, composting operations should not be located closer than the greater of the following distances: 1,200 feet from any aircraft movement area, loading ramp, or aircraft parking space; or the distance called for by airport design requirements. This spacing is intended to prevent material, personnel, or equipment from penetrating any Obstacle Free Area (OFA), Obstacle Free Zone (OFZ), Threshold Siting Surface (TSS), or Clearway (see AC 150/5300-13, *Airport Design*). On-airport disposal of compost by-products is not recommended for the reasons stated in 2-3.d.

a. **Composition of material handled.** Components of the compost should never include any municipal solid waste. Non-food waste such as leaves, lawn clippings, branches, and twigs generally are not considered a wildlife attractant. Sewage sludge, wood-chips, and similar material are not municipal solid wastes and may be used as compost bulking agents.

b. **Monitoring on-airport composting operations.** If composting operations are to be located on airport property, FAA recommends that the airport operator monitor composting operations to ensure that steam or thermal rise does not affect air traffic in any way. Discarded leaf disposal bags or other debris must not be allowed to blow onto any active airport area. Also, the airport operator should reserve the right to stop any operation that creates unsafe, undesirable, or incompatible conditions at the airport.

3-5. ASH DISPOSAL. Fly ash from resource recovery facilities that are fired by municipal solid waste, coal, or wood, is generally considered not to be a wildlife attractant because it contains no putrescible matter. FAA generally does not consider landfills accepting only fly ash to be wildlife attractants, if those landfills: are maintained in an orderly manner; admit no putrescible-waste of any kind; and are not co-located with other disposal operations.

Since varying degrees of waste consumption are associated with general incineration, FAA classifies the ash from general incinerators as a regular waste disposal by-product and, therefore, a hazardous wildlife attractant.

3-6. CONSTRUCTION AND DEMOLITION (C&D) DEBRIS LANDFILLS. C&D debris (Class IV) landfills have visual and operational characteristics similar to putrescible-waste disposal sites. When co-located with putrescible-waste disposal operations, the probability of hazardous wildlife attraction to C&D landfills increases because of the similarities between these disposal activities.

FAA generally does not consider C&D landfills to be hazardous wildlife attractants, if those landfills: are maintained in an orderly manner; admit no putrescible-waste of any kind; and are not co-located with other disposal operations.

3-7. WATER DETENTION OR RETENTION PONDS. The movement of storm water away from runways, taxiways, and aprons is a normal function on most airports and is necessary for safe aircraft operations. Detention ponds hold storm water for short periods, while retention ponds hold water indefinitely. Both types of ponds control runoff, protect water quality, and can attract hazardous wildlife. Retention ponds are more attractive to hazardous wildlife than detention ponds because they provide a more reliable water source.

To facilitate hazardous wildlife control, FAA recommends using steep-sided, narrow, linearly-shaped, rip-rap lined, water detention basins rather than retention basins. When possible, these ponds should be placed away from aircraft movement areas to minimize aircraft-wildlife interactions. All vegetation in or around detention or retention basins that provide food or cover for hazardous wildlife should be eliminated.

If soil conditions and other requirements allow, FAA encourages the use of underground storm water infiltration systems, such as French drains or buried rock fields, because they are less attractive to wildlife.

3-8. LANDSCAPING. Wildlife attraction to landscaping may vary by geographic location. FAA recommends that airport operators approach landscaping with caution and confine it to airport areas not associated with aircraft movements. All landscaping plans should be reviewed by a wildlife damage management biologist. Landscaped areas should be monitored on a continuing basis for the presence of hazardous wildlife. If hazardous wildlife is detected, corrective actions should be implemented immediately.

3-9. GOLF COURSES. Golf courses may be beneficial to airports because they provide open space that can be used for noise mitigation or by aircraft during an emergency. On-airport golf courses may also be a concurrent use that provides income to the airport.

Because of operational and monetary benefits, golf courses are often deemed compatible land uses on or near airports. However, waterfowl (especially Canada geese) and some species of gulls are attracted to the large, grassy areas and open water found on most golf courses. Because waterfowl and gulls occur throughout the U.S., FAA recommends that airport operators exercise caution and consult with a wildlife damage management biologist when considering proposals for golf

course construction or expansion on or near airports. Golf courses should be monitored on a continuing basis for the presence of hazardous wildlife. If hazardous wildlife is detected, corrective actions should be implemented immediately.

3-10. AGRICULTURAL CROPS. As noted above, airport operators often promote revenue-generating activities to supplement an airport's financial viability. A common concurrent use is agricultural crop production. Such use may create potential hazards to aircraft by attracting wildlife. Any proposed on-airport agricultural operations should be reviewed by a wildlife damage management biologist. FAA generally does not object to agricultural crop production on airports when: wildlife hazards are not predicted; the guidelines for the airport areas specified in 3-10.a-f. are observed; and the agricultural operation is closely monitored by the airport operator or sponsor to ensure that hazardous wildlife are not attracted.

NOTE: If wildlife becomes a problem due to on-airport agricultural operations, FAA recommends undertaking the remedial actions described in 3-10.f.

a. Agricultural activities adjacent to runways. To ensure safe, efficient aircraft operations, FAA recommends that no agricultural activities be conducted in the Runway Safety Area (RSA), OFA, and the OFZ (see AC 150/5300-13).

b. Agricultural activities in areas requiring minimum object clearances. Restricting agricultural operations to areas outside the RSA, OFA, OFZ, and Runway Visibility Zone (RVZ) (see AC 150/5300-13) will normally provide the minimum object clearances required by FAA's airport design standards. FAA recommends that farming operations not be permitted within areas critical to the proper operation of localizers, glide slope indicators, or other visual or electronic navigational aids. Determinations of minimal areas that must be kept free of farming operations should be made on a case-by-case basis. If navigational aids are present, farm leases for on-airport agricultural activities should be coordinated with FAA's Airway Facilities Division, in accordance with FAA Order 6750.16, *Siting Criteria for Instrument Landing Systems*.

NOTE: Crop restriction lines conforming to the dimensions set forth in Table 2 will normally provide the minimum object clearance required by

FAA airport design standards. The presence of navigational aids may require expansion of the restricted area.

c. Agricultural activities within an airport's approach areas. The RSA, OFA, and OFZ all extend beyond the runway shoulder and into the approach area by varying distances. The OFA normally extends the farthest and is usually the controlling surface. However, for some runways, the TSS (see AC 150/5300-13, Appendix 2) may be more controlling than the OFA. The TSS may not be penetrated by any object. The minimum distances shown in Table 2 are intended to prevent penetration of the OFA, OFZ, or TSS by crops or farm machinery.

NOTE: Threshold Siting standards should not be confused with the approach areas described in Title 14, Code of Federal Regulations, Part 77, (14 CFR 77), *Objects Affecting Navigable Airspace*.

d. Agricultural activities between intersecting runways. FAA recommends that no agricultural activities be permitted within the RVZ. If the terrain is sufficiently below the runway elevation, some types of crops and equipment may be acceptable. Specific determinations of what is permissible in this area requires topographical data. For example, if the terrain within the RVZ is level with the runway ends, farm machinery or crops may interfere with a pilot's line-of-sight in the RVZ.

e. Agricultural activities in areas adjacent to taxiways and aprons. Farming activities should not be permitted within a taxiway's OFA. The outer portions of aprons are frequently used as a taxilane and farming operations should not be permitted within the OFA. Farming operations should not be permitted between runways and parallel taxiways.

f. Remedial actions for problematic agricultural activities. If a problem with hazardous wildlife develops, FAA recommends that a professional wildlife damage management biologist be contacted and an on-site inspection be conducted. The biologist should be requested to determine the source of the hazardous wildlife attraction and suggest remedial action. Regardless of the source of the attraction, prompt remedial actions to protect aviation safety are recommended. The remedial actions may range from choosing another crop or farming technique to complete termination of the agricultural operation.

Whenever on-airport agricultural operations are stopped due to wildlife hazards or annual harvest, FAA recommends plowing under all crop residue and harrowing the surface area smooth. This will reduce or eliminate the area's attractiveness to foraging wildlife. FAA recommends that this requirement be written into all on-airport farm use contracts and clearly understood by the lessee.

Table 2. Minimum Distances Between Certain Airport Features And Any On-Airport Agriculture Crops.

Aircraft Approach Category And Design Group ¹	Distance In Feet From Runway Centerline To Crop		Distance In Feet From Runway End To Crop		Distance In Feet From Centerline Of Taxiway To Crop	Distance In Feet From Edge Of Apron To Crop
	Visual & $\geq \frac{1}{2}$ mile	$< \frac{1}{2}$ mile	Visual & $\geq \frac{1}{2}$ mile	$< \frac{1}{2}$ mile		
Category A & B Aircraft						
Group I	200'	400	300'	600	45	40
Group II	250	400	400'	600	66	58
Group III	400	400	600	800	93	81
Group IV	400	400	1,000	1,000	130	113
Category C, D & E Aircraft						
Group I	530'	575'	1,000	1,000	45	40
Group II	530'	575'	1,000	1,000	66	58
Group III	530'	575'	1,000	1,000	93	81
Group IV	530'	575'	1,000	1,000	130	113
Group V	530'	575'	1,000	1,000	160	138
Group VI	530'	575'	1,000	1,000	193	167

1. Design Groups are based on wing span, and Category depends on approach speed of the aircraft.

Group I: Wing span up to 49 ft.

Group II: Wing span 49 ft. up to 78 ft.

Group III: Wing span 79 ft. up to 117 ft.

Group IV: Wing span 118 ft. up to 170 ft.

Group V: Wing span 171 ft. up to 213 ft.

Group VI: Wing span 214 ft. up to 261 ft.

Category A:

Speed less than 91 knots

Category B: Speed 91 knots up to 120 knots

Category C: Speed 121 knots up to 140 knots

Category D: Speed 141 knots up to 165 knots

Category E: Speed 166 knots or more

2. If the runway will only serve small airplanes (12,500 lb. and under) in Design Group I, this dimension may be reduced to 125 feet; however, this dimension should be increased where necessary to accommodate visual navigational aids that may be installed. For example farming operations should not be allowed within 25 feet of a Precision Approach Path Indicator (PAPI) light box.

3. These dimensions reflect the TSS as defined in AC 150/5300-13, Appendix 2. The TSS cannot be penetrated by any object. Under these conditions, the TSS is more restrictive than the OFA, and the dimensions shown here are to prevent penetration of the TSS by crops and farm machinery.

5/1/97

SECTION 4. NOTIFICATION OF FAA ABOUT HAZARDOUS WILDLIFE ATTRACTANTS ON OR NEAR AN AIRPORT.

4.1. **GENERAL** Airport operators, land developers, and owners should notify the FAA in writing of known or reasonably foreseeable land use practices on or near airports that either attract or may attract hazardous wildlife. This section discusses those notification procedures.

4.2. **NOTIFICATION REQUIREMENTS FOR WASTE DISPOSAL SITE OPERATIONS.** The Environmental Protection Agency (EPA) requires any operator proposing a new or expanded waste disposal operation within 5 statute miles of a runway end to notify the appropriate FAA Regional Airports Division Office and the airport operator of the proposal (40 CFR 258, *Criteria for Municipal Solid Waste Landfills*, section 258.10, *Airport Safety*). The EPA also requires owners or operators of new municipal solid waste landfill (MSWLF) units, or lateral expansions of existing MSWLF units that are located within 10,000 feet of any airport runway end used by turbojet aircraft or within 5,000 feet of any airport runway end used only by piston-type aircraft, to demonstrate successfully that such units are not hazards to aircraft.

a. **Timing of Notification.** When new or expanded MSWLFs are being proposed near airports, MSWLF operators should notify the airport operator and the FAA of this as early as possible pursuant to 40 CFR Part 258. Airport operators should encourage the MSWLF operators to provide notification as early as possible.

NOTE: AC 150/5000-3 provides information on these FAA offices.

b. **Putrescible-Waste Facilities.** In their effort to satisfy the EPA requirement, some putrescible-waste facility proponents may offer to undertake experimental measures to demonstrate that their proposed facility will not be a hazard to aircraft. To date, the ability to sustain a reduction in the numbers of hazardous wildlife to levels that existed before a putrescible-waste landfill began operating has not been successfully demonstrated. For this reason, demonstrations of experimental wildlife control measures should not be conducted in active aircraft operations areas.

c. **Other Waste Facilities.** To claim successfully that a waste handling facility sited within the separations identified in the siting criteria in 1-3

does not attract hazardous wildlife and does not threaten aviation, the developer must establish convincingly that the facility will not handle putrescible material other than that as outlined in 3-2. FAA requests that waste site developers provide a copy of an official permit request verifying that the facility will not handle putrescible material other than that as outlined in 3-2. FAA will use this information to determine if the facility will be a hazard to aviation.

4.3. **NOTIFYING FAA ABOUT OTHER WILDLIFE ATTRACTANTS.** While U. S. EPA regulations require landfill owners to provide notification, no similar regulations require notifying FAA about changes in other land use practices that can create hazardous wildlife attractants. Although it is not required by regulation, FAA requests those proposing land use changes such as those discussed in 2-3, 2-4, and 2-5 to provide similar notice to the FAA as early in the development process as possible. Airport operators that become aware of such proposed development in the vicinity of their airports should also notify the FAA. The notification process gives the FAA an opportunity to evaluate the effect of a particular land use change on aviation safety.

The land use operator or project proponent may use FAA Form 7460-1, *Notice of Proposed Construction or Alteration*, or other suitable documents to notify the appropriate FAA Regional Airports Division Office.

It is helpful if the notification includes a 15-minute quadrangle map of the area identifying the location of the proposed activity. The land use operator or project proponent should also forward specific details of the proposed land use change or operational change or expansion. In the case of solid waste landfills, the information should include the type of waste to be handled, how the waste will be processed, and final disposal methods.

4.5. **FAA REVIEW OF PROPOSED LAND USE CHANGES.**

a. The FAA discourages the development of facilities discussed in section 2 that will be located within the 5,000/10,000-foot criteria in 1-3.

b. For projects which are located outside the 5,000/10,000-foot criteria, but within 5 statute miles of the airport's aircraft movement areas, loading ramps, or aircraft parking areas, FAA may review development plans, proposed land use changes, operational changes, or wetland mitigation plans to determine if such changes present potential wildlife hazards to aircraft operations. Sensitive airport areas will be identified as those that lie under or next to approach or departure airspace. This brief examination should be sufficient to determine if further investigation is warranted.

c. Where further study has been conducted by a wildlife damage management biologist to evaluate a site's compatibility with airport operations, the FAA will use the study results to make its determination.

d. FAA will discourage the development of any excepted sites (see Section 3) within the criteria specified in 1-3 if a study shows that the area supports hazardous wildlife species.

4-6. AIRPORT OPERATORS. Airport operators should be aware of proposed land use changes, or modification of existing land uses, that could create hazardous wildlife attractants within the separations identified in the siting criteria in 1-3. Particular attention should be given to proposed land uses involving creation or expansion of waste water treatment facilities, development of wetland mitigation sites, or development or expansion of dredge spoil containment areas.

a. AIP-funded airports. FAA recommends that operators of AIP-funded airports, to the extent practicable, oppose off-airport land use changes or practices (within the separations identified in the siting criteria in 1-3) that may attract hazardous wildlife. Failure to do so could place the airport operator or sponsor in noncompliance with applicable grant assurances.

FAA recommends against the placement of airport development projects pertaining to aircraft movement in the vicinity of hazardous wildlife attractants. Airport operators, sponsors, and planners should identify wildlife attractants and any associated wildlife hazards during any planning process for new airport development projects.

b. **Additional coordination.** If, after the initial review by FAA, questions remain about the existence of a wildlife hazard near an airport, the airport operator or sponsor should consult a wildlife damage management biologist. Such questions may be triggered by a history of wildlife strikes at the airport or the proximity of the airport to a wildlife refuge, body of water, or similar feature known to attract wildlife.

c. **Specialized assistance.** If the services of a wildlife damage management biologist are required, FAA recommends that land use developers or the airport operator contact the appropriate state director of the United States Department of Agriculture/Animal Damage Control (USDA/ADC), or a consultant specializing in wildlife damage management. Telephone numbers for the respective USDA/ADC state offices may be obtained by contacting USDA/ADC's Operational Support Staff, 4700 River Road, Unit 87, Riverdale, MD, 20737-1234, Telephone (301) 734-7921, Fax (301) 734-5157. The ADC biologist or consultant should be requested to identify and quantify wildlife common to the area and evaluate the potential wildlife hazards.

d. **Notifying airmen.** If an existing land use practice creates a wildlife hazard, and the land use practice or wildlife hazard cannot be immediately eliminated, the airport operator should issue a Notice to Airmen (NOTAM) and encourage the land owner or manager to take steps to control the wildlife hazard and minimize further attraction.

APPENDIX I. DEFINITIONS OF TERMS USED IN THIS ADVISORY CIRCULAR.

1. GENERAL. This appendix provides definitions of terms used throughout this AC.

a. Aircraft movement area. The runways, taxiways, and other areas of an airport which are used for taxiing or hover taxiing, air taxiing, takeoff, and landing of aircraft exclusive of loading ramps and aircraft parking areas.

b. Airport operator. The operator (private or public) or sponsor of a public use airport.

c. Approach or departure airspace. The airspace, within 5 statute miles of an airport, through which aircraft move during landing or takeoff.

d. Concurrent use. Aeronautical property used for compatible non-aviation purposes while at the same time serving the primary purpose for which it was acquired; and the use is clearly beneficial to the airport. The concurrent use should generate revenue to be used for airport purposes (see Order 5190.6A, *Airport Compliance Requirements*, sect. 5h).

e. Fly ash. The fine, sand-like residue resulting from the complete incineration of an organic fuel source. Fly ash typically results from the combustion of coal or waste used to operate a power generating plant.

f. Hazardous wildlife. Wildlife species that are commonly associated with wildlife-aircraft strike problems, are capable of causing structural damage to airport facilities, or act as attractants to other wildlife that pose a wildlife-aircraft strike hazard.

g. Piston-use airport. Any airport that would primarily serve FIXED-WING, piston-powered aircraft. Incidental use of the airport by turbine-powered, FIXED-WING aircraft would not affect this designation. However, such aircraft should not be based at the airport.

b. Public-use airport. Any publicly owned airport or a privately-owned airport used or intended to be used for public purposes.

i. Putrescible material. Rotting organic material.

j. Putrescible-waste disposal operation. Landfills, garbage dumps, underwater waste discharges, or similar facilities where activities include processing, burying, storing, or otherwise disposing of putrescible material, trash, and refuse.

k. Runway protection zone (RPZ). An area off the runway end to enhance the protection of people and property on the ground (see AC 150/5300-13). The dimensions of this zone vary with the design aircraft, type of operation, and visibility minimum.

l. Sewage sludge. The de-watered effluent resulting from secondary or tertiary treatment of municipal sewage and/or industrial wastes, including sewage sludge as referenced in U.S. EPA's *Effluent Guidelines and Standards*, 40 C.F.R. Part 401.

m. Shoulder. An area adjacent to the edge of paved runways, taxiways, or aprons providing a transition between the pavement and the adjacent surface, support for aircraft running off the pavement, enhanced drainage, and blast protection (see AC 150/5300-13).

n. Turbine-powered aircraft. Aircraft powered by turbine engines including turbojets and turboprops but excluding turbo-shaft rotary-wing aircraft.

o. Turbine-use airport. Any airport that ROUTINELY serves FIXED-WING turbine-powered aircraft.

p. Wastewater treatment facility. Any devices and/or systems used to store, treat, recycle, or reclaim municipal sewage or liquid industrial wastes, including Publicly Owned Treatment Works (POTW), as defined by Section 212 of the Federal Water Pollution Control Act (P.L. 92-500) as amended by the Clean Water Act of 1977 (P.L. 95-576) and the Water Quality Act of 1987 (P.L. 100-4). This definition includes any pretreatment involving the reduction of the amount of pollutants, the elimination of pollutants, or the alteration of the nature of pollutant properties in wastewater prior to or in lieu of discharging or otherwise introducing such pollutants into a POTW. (See 40 C.F. R. Section 403.3 (o), (p), & (q)).

q. **Wildlife.** Any wild animal, including without limitation any wild mammal, bird, reptile, fish, amphibian, mollusk, crustacean, arthropod, coelenterate, or other invertebrate, including any part, product, egg, or offspring thereof (50 CFR 10.12. - *Taking, Possession, Transportation, Sale, Purchase, Barter, Exportation, and Importation of Wildlife and Plants*). As used in this AC, WILDLIFE includes feral animals and domestic animals while out of the control of their owners (14 CFR 139.3, *Certification and Operations: Land Airports Serving CAB-Certificated Scheduled Air Carriers Operating Large Aircraft (Other Than Helicopters)*).

r. **Wildlife attractants.** Any human-made structure, land use practice, or human-made or natural geographic feature, that can attract or sustain hazardous wildlife within the landing or departure airspace, aircraft movement area, loading ramps, or aircraft parking areas of an airport. These attractants can include but are not limited to architectural features, landscaping, waste disposal sites, wastewater treatment facilities, agricultural or aquacultural activities, surface mining, or wetlands.

s. **Wildlife hazard.** A potential for a damaging aircraft collision with wildlife on or near an airport (14 CFR 139.3).

2. RESERVED.

Appendix F

The Natomas Basin Conservancy By-Laws.

AMENDED AND RESTATED

BYLAWS

OF

**THE NATOMAS BASIN
CONSERVANCY,**

**A California Non-Profit
Public Benefit Corporation**

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**AMENDED AND RESTATED BYLAWS OF
THE NATOMAS BASIN CONSERVANCY,
A CALIFORNIA NON-PROFIT PUBLIC BENEFIT CORPORATION**

ARTICLE I

NAME

The name of this corporation is The Natomas Basin Conservancy, a California Non-Profit Public Benefit Corporation.

ARTICLE II

OFFICES

Section 1. Principal Office.

The principal office for the transaction of the activities and the affairs of the corporation shall be located in the County of Sacramento, California. The Board of Directors may change the principal office from one location to another, provided such location is within either the County of Sacramento or County of Sutter, State of California. Any change of location of the principal office shall be noted by the Secretary of the corporation on these Bylaws opposite this section or this section may be amended to state the new location.

Section 2. Other Offices.

The corporation may establish such other offices as the Board of Directors deems necessary from time to time on a geographical or functional basis.

ARTICLE III

PURPOSES

This corporation is formed for public, scientific and educational purposes, including but not limited to, the study, preservation, protection or enhancement of land in its natural, scenic, historical, agricultural, or open space condition or use in order to preserve habitat values necessary for the plants and wildlife which inhabit such lands; the preservation, study and enhancement of habitat values on such lands used by candidate, threatened and endangered species listed under the Federal Endangered Species Act and the California Endangered Species Act, species of "Special Concern" as denominated by the California Department of Fish and Game ("CDFG"), and other species of plant and wildlife; to acquire by fee title or by conservation easement lands pursuant to the Natomas Basin Habitat Conservation Plan, to preserve, enhance and/or restore the habitat values of such lands, to manage such lands and make productive use thereof as allowed by the Natomas Basin Habitat Conservation Plan; and any other lawful purpose allowed for a corporation organized pursuant to the California Nonprofit Public Benefit Corporation Law.

ARTICLE IV

MEMBERS

This corporation shall have no members. Any action which would otherwise require a vote of members shall require only a vote of the Board of Directors. Except as otherwise provided herein, all rights which would otherwise vest in members shall vest in the Board of Directors.

ARTICLE V

BOARD OF DIRECTORS

Section 1. Powers.

A. General Corporation Powers. Subject to the provisions and limitations of the Articles of Incorporation, other sections of these Bylaws, the California Nonprofit Public Benefit Corporation Law, and any other applicable law, all corporate powers of the corporation shall be exercised by or under the authority of, and the business and affairs of the corporation shall be controlled by, the Board of Directors.

B. Specific Powers. Without prejudice to the general powers set forth in Section 1 of Article V of these Bylaws, but subject to the same limitations, the Directors shall have the authority to:

- (1) Select and remove, at the pleasure of the Board of Directors, officers, agents, and employees of the corporation; prescribe such powers and duties for them as may be consistent with the law, the Articles of Incorporation, and these Bylaws; and fix their compensation and require from them security for faithful performance of their duties.
- (2) Conduct, manage, and control the affairs and business of the corporation, and to make rules and regulations consistent with the law, the Articles of Incorporation, and these Bylaws.
- (3) Borrow money and incur indebtedness on behalf of the corporation, and cause to be executed and delivered for the corporation's purposes, in the corporate name, promissory notes, bonds, debentures, deeds of trust, mortgages, pledges, hypothecation, or evidence of debt and securities.
- (4) Change the principal office from one location to another within Sacramento County or Sutter County, California.

Section 2. Number and Qualifications of Directors.

A. Number. The authorized number of Directors shall be a minimum of three (3) and a maximum of twelve (12). No reduction of the authorized number of Directors shall have the effect of removing any Director before that Director's term of office expires.

B. Qualifications. The Directors in every case shall be individuals who are willing to participate as members of the Board of Directors of the corporation. To avoid conflicts of interest, no Director shall be a current employee of the United States Fish and Wildlife Service ("USFWS"), the United States Department of the Interior, CDFG or the State of California's Resources Agency at the time of serving as a Director.

C. Director as Interested Person. Not more than twenty-five percent (25%) of the persons serving on the Board of Directors at any time may be interested persons. For the purpose of the foregoing, "interested person" means any person currently being compensated by the corporation for services rendered to it within the previous twelve (12) months, whether as a full-time or part-time employee, independent contractor or otherwise (excluding any reasonable compensation paid to a Director as a Director), or any brother, sister, ancestor, descendant, spouse, brother-in-law, sister-in-law, son-in-law, daughter-in-law, mother-in-law or father-in-law of any such person.

Section 3. Term of Office.

The members of the Board of Directors shall be designated in accordance with Section 4 below. Each Director, including a Director designated to fill a vacancy, shall hold office until expiration of the term for which designated and until a successor has been designated. Members of the Board of Directors shall serve staggered terms of one, two or three years as follows:

A. City of Sacramento Appointees. The three (3) Directors appointed by the City of Sacramento shall have one (1) Director who serves for an initial one (1)-year term, one (1) Director who serves for an initial two (2)-year term, and one (1) Director who serves for an initial three (3)-year term; provided, however, that if the City of Sacramento in accordance with Section 4.A, as amended, appoints five (5) Directors, then two (2) Directors shall serve for an initial one (1)-year term, two (2) Directors who serve for an initial two (2)-year term, and one (1) Director who serve for an initial three (3)-year term;

If, following the appointment of five (5) Directors, the number of Directors appointed by the City of Sacramento is reduced to three (3), as soon as practicable thereafter, the terms of office to which the next three (3) Directors are appointed may be shorter or longer than the Directors' predecessors so as to return to the one (1), two (2) and three (3)-year staggering of terms.

B. County of Sacramento Appointees. At such time as the County of Sacramento executes an Implementation Agreement with the USFWS and CDFG and receives a Federal Endangered Species Act of 1973 Section 10(1)(1)(B) Permit from USFWS and a Section 2081 Management Authorization (the "Permits"), the County may appoint one (1) Director who serves for an initial one (1)-year term, one (1) Director who serves for an initial two (2)-year term, and one (1) Director who serves for an initial three (3)-year term, except as provided for in Section 4, "Designation of Directors" below.

C. County of Sutter Appointees. At such time as the County of Sutter executes an Implementation Agreement with the USFWS and CDFG and receives the Permits, the County may appoint one (1) Director who serves for an initial one (1)-year term, one (1) Director who serves for an initial two (2)-year term, and one (1) Director

who serves for an initial three (3)-year term, except as provided for in Section 4, "Designation of Directors" below.

D. Natomas Central Mutual Water Company Appointee. At such time as the Natomas Central Mutual Water Company executes an Implementation Agreement with the USFWS and CDFG and receives the Permits, it may appoint one (1) Director who serves for a one (1)-year term.

E. Reclamation District 1000 Appointee. At such time as Reclamation District 1000 executes an Implementation Agreement with the USFWS and CDFG and receives the Permits, it may appoint one (1) Director who serves for a one (1)-year term.

If not otherwise designated by the appointing agency, selection of terms for the first Directors appointed by an agency shall be conducted by drawing lots at the first meeting attended by the Directors following their respective appointments. Except for the terms necessary to create the staggering of terms, members of the Board of Directors shall serve three (3)-year terms, except as otherwise provided for.

Section 4. Designation of Directors.

A. Designation by City of Sacramento. The Mayor of the City of Sacramento, with the concurrence of a majority of the City Council, shall be entitled to designate three (3) Directors when the City of Sacramento has received the Permits; provided, however, that the Mayor of the City of Sacramento may, with the concurrence of a majority of the City Council, designate five (5) Directors when the City of Sacramento has received the Permits, if at that time neither the County of Sacramento nor the County of Sutter has received a Permit. If five (5) Directors are appointed pursuant to this provision, and if both the County of Sacramento and the County of Sutter thereafter receives a Permit, the Sacramento City Council shall forthwith act to reduce the number of Directors to three (3), unless the Natomas Basin Habitat Conservation Plan and the Implementation Agreement have been previously amended to increase the number of Directors.

B. Designation by County of Sacramento. The Chair of the Board of Supervisors of the County of Sacramento, with the concurrence of a majority of the Board of Supervisors, shall be entitled to designate five (5) Directors when the County of Sacramento has received the Permits unless the City of Sacramento and Sutter County have both received Permits. If the City of Sacramento and Sutter County have received Permits, then Sacramento County may appoint three (3). If five (5) Directors are appointed pursuant to this provision, and if both the City of Sacramento and the County of Sutter thereafter receive Permits, the County of Sacramento shall forthwith act to reduce the number of Directors to three (3), unless the Natomas Basin Habitat Conservation Plan and the Implementation Agreement have been previously amended to increase the number of Directors.

C. Designation by County of Sutter. The Chair of the Board of Supervisors of the County of Sutter, with the concurrence of a majority of the Board of Supervisors, shall be entitled to designate five (5) Directors when the County of Sutter has received the Permits unless the City of Sacramento and Sacramento County have received Permits. If the City of Sacramento and Sacramento County have both received Permits, then Sutter County may appoint three (3). If five (5) Directors are appointed pursuant

to this provision, and if both the City of Sacramento and the County of Sacramento thereafter receive Permits, the County of Sutter shall forthwith act to reduce the number of Directors to three (3), unless the Natomas Basin Habitat Conservation Plan and the Implementation Agreement have been previously amended to increase the number of Directors.

D. Designation by Natomas Central Mutual Water Company. The Chair of the Board of Directors of Natomas Central Mutual Water Company, with the concurrence of a majority of the Board of Directors, shall be entitled to designate one (1) Director when it has received the Permits.

E. Designation by Reclamation District 1000. The Chair of the Board of Directors of Reclamation District 1000, with the concurrence of a majority of the Board of Directors, shall be entitled to designate one (1) Director when it has received the Permits.

All Directors shall possess the qualifications described in these Bylaws for Directors of the corporation.

Section 5. Vacancies.

Vacancies on the Board of Directors because of death, resignation, removal, disqualification or otherwise shall be filled by the entity or person empowered in Section 4 to designate the member for such seat on the Board. A successor Director so designated shall serve for the remainder of the term for which designated.

Section 6. Meetings of the Board of Directors.

A. Place of Meetings. Except as provided below, regular and special meetings of the Board of Directors shall be held at the principal office of the corporation, or at any other place within the County of Sacramento or County of Sutter that has been designated from time to time in writing by resolution of the Board of Directors or by written consent of all members of the Board. In the absence of any such designation, regular meetings shall be held at the principal office of the corporation. Meetings may be held outside the County of Sacramento or County of Sutter for any of the following:

- (1) To comply with state or federal law or court order, or attend a judicial or administrative proceeding to which the corporation is a party.
- (2) To inspect real or personal property which cannot be conveniently brought within the boundaries of the County of Sacramento or the County of Sutter, provided that the topic of the meeting is limited to items directly related to the real or personal property.
- (3) To participate in meetings or discussions of multiagency significance that are outside the County of Sacramento or the County of Sutter. However, any meeting or discussion held pursuant to this subdivision shall take place within the jurisdiction

of one of the participating local agencies and be noticed by all participating agencies as provided for in this chapter.

- (4) To meet in the closest meeting facility if the corporation has no meeting facility within the County of Sacramento or the County of Sutter, or at the principal office of the corporation if that office is located outside the County of Sacramento or the County of Sutter.
- (5) To meet outside the County of Sacramento or the County of Sutter with elected or appointed officials of the United States or the State of California when a local meeting would be impractical, solely to discuss a legislative or regulatory issue affecting the corporation and over which the federal or state officials have jurisdiction.
- (6) To meet outside the County of Sacramento or the County of Sutter if the meeting takes place in or nearby a facility owned by the agency, provided that the topic of the meeting is limited to items directly related to the facility.
- (7) To visit the office of the corporation's legal counsel for a closed session on pending litigation held pursuant to Government Code ("Code") Section 54956.9, when to do so would reduce legal fees or costs.

B. Annual Meeting. The annual meeting of the Board of Directors shall be for the purposes of orientation and organization of the Board and the transaction of other business. The annual meeting of the Board of Directors shall be held no later than March 31 of each year at a place within the County of Sacramento or the County of Sutter as the Board of Directors may designate. Such meetings shall be held with notice as provided herein.

C. Regular Meetings. The regular meetings of the Board of Directors shall be held with notice at such time and place within the County of Sacramento or County of Sutter as shall from time to time be fixed by the Board of Directors. In the event the date of a regular meeting shall fall on a legal holiday, the meeting shall be held on the next succeeding business day.

D. Special Meetings. A special meeting may be called at any time by the Chair or President or by a majority of the Board of Directors by written notice delivered personally or by any other means to each member of the Board and received at least twenty-four (24) hours before the time of the meeting as specified in the notice. The call and notice shall specify the time and place of the special meeting and the business to be transacted or discussed and shall be posted as set forth in Section F below. No other business shall be considered at these meetings by the Board of Directors. The written notice may be dispensed with as to any member who at or prior to the time the meeting convenes files with the Secretary or clerk of the corporation a written waiver of notice. The waiver may be given by telegram. The written notice may also be dispensed with as to any member who is actually present at the meeting at the time it convenes.

E. Action by Teleconference. The Board of Directors may use teleconferencing in connection with any meeting or proceeding authorized by law. The teleconferenced meeting or proceeding shall comply with all requirements of this Section 7 and all otherwise applicable provisions of law relating to a specific type of meeting or proceeding.

Teleconferencing may be used for all purposes in connection with any meeting. All votes taken during a teleconferenced meeting shall be by roll call.

If the Board of Directors elects to use teleconferencing, it shall post agendas at all teleconference locations and conduct teleconference meetings in a manner that protects the statutory and constitutional rights of the parties or the public appearing before the Board. Each teleconference location shall be identified in the notice and agenda of the meeting or proceeding, and each teleconference location shall be accessible to the public. During the teleconference, at least a quorum of the members of the Board of Directors shall participate from locations within the County of Sacramento and the County of Sutter. The agenda shall provide an opportunity for members of the public to address the Board directly at each teleconference location.

For the purposes of this section, "teleconference" means a meeting of the Board of Directors, the members of which are in different locations, connected by electronic means, through either audio or video, or both. Nothing in this section shall prohibit the corporation from providing the public with additional teleconference locations.

F. Posting Agendas/Notices. The Secretary or his or her authorized representative shall post an agenda for each regular Board of Directors meeting or a notice for each special Board of Directors meeting containing a brief description of each item of business to be transacted or discussed at the meeting, together with the time and location of the meeting. Agendas/notices shall be posted at the corporation's principal office (at a location readily accessible to the public) at least seventy-two (72) hours in advance of each regular meeting and at least twenty-four (24) hours in advance of each special meeting. The Secretary shall maintain a record of such posting.

G. Right of Public to Appear and Speak. At every regular meeting, members of the public shall have an opportunity to address the Board of Directors on matters within the corporation's subject matter jurisdiction. Except for matters scheduled for formal public hearing, public input and comment on matters on the agenda, as well as public input and comment on matters not otherwise on the agenda, shall be made during the time set aside for public comment; provided, however, that the Board of Directors may direct that public input and comment on matters on the agenda be heard when the matter regularly comes up on the agenda.

The Chair or presiding officer may limit the total amount of time allocated for public discussion by particular issues and/or the time allocated for each individual speaker.

H. Nonagenda Items. Matters brought before the Board of Directors at a regular meeting which were not placed on the agenda of the meeting shall not be acted upon by the Board at that meeting unless action on such matters is permissible pursuant to the Brown Act (Code § 54950 et seq.). Those nonagenda items brought before the Board of Directors which the Board determines will require consideration

and action and where Board action at that meeting is not so authorized shall either be placed on the agenda for the next regular meeting or referred to staff, as directed by the Chair or the presiding officer.

I. Quorum. A majority of the members of the Board of Directors shall constitute a quorum for the purpose of conducting the corporation's business, exercising Board's powers, and for all other purposes, but a smaller number may adjourn from time to time until the quorum is obtained. Every official act of the Board of Directors shall be adopted by a majority vote. A "majority vote" shall mean a majority of all members present when a quorum is present. A meeting at which a quorum is initially present may continue to transact business, notwithstanding the withdrawal of enough Directors to leave less than a quorum, if any action taken is approved by at least a majority of the required quorum for such meeting.

J. Manner of Voting. The voting on formal resolutions, matters to any federal, state, county or city agency, and on such other matters as may be requested by a majority of the Board of Directors members, shall be by roll call, and the ayes, noes and members present not voting shall be entered upon the minutes of such meeting, except on the election of officers, which may be by ballot.

K. Adjournment. The Board of Directors may adjourn any regular, adjourned regular, special or adjourned special meeting to a time and place specified in the order of adjournment. Less than a quorum may so adjourn from time to time. If all members are absent from any regular or adjourned regular meeting, the secretary or clerk of the corporation may declare the meeting adjourned to a stated time and place and he or she shall cause a written notice of the adjournment to be given in the same manner as provided for special meetings, unless such notice is waived as provided for special meetings. A copy of the order or notice of adjournment shall be conspicuously posted on or near the door of the place where the regular, adjourned regular, special or adjourned special meeting was held within twenty-four (24) hours after the time of adjournment. When an order of adjournment of any meeting fails to state the hour at which the adjourned meeting is to be held, it shall be held at the hour specified for regular meetings or by resolution.

L. Brown Act Requirements. The provisions contained in this Section 6 are consistent with the provisions set forth in the Ralph M. Brown Act, Code Section 54950 et seq (the "Act"). In the event any provision contained herein is inconsistent with the Brown Act as it currently exists or as it may be subsequently amended, the provisions contained in the Act shall prevail, provided, however, that the provisions of the Act regarding the disclosure of information with respect to real property transactions (including but not limited to Gov. Code, §§ 54954.5(b); 54956.8 and 54957.1(a)(1)) whether such transactions are pending or completed, shall not apply. As used herein, "real property transactions" shall include options to purchase or lease, purchases, and leases of real property, as well as farming contracts affecting real property that NBC has acquired or is in negotiations to acquire. This exception to the Act shall only apply if the applicable habitat conservation plans (HCPs) and implementation agreements (IAs) have been amended to provide for this exception.

Section 7. Resignation.

Any Director may resign at any time by giving written notice of such resignation to the Chair of the Board, the President, the Secretary or the Board of Directors of the corporation and to the Mayor of the City of Sacramento if appointed by the Mayor, or the Clerk of the Board of Supervisors of the appointing county if appointed by the county. Such resignation shall take effect at the time specified in the notice; provided, however, that if the resignation is not to be effective upon receipt of the notice by the corporation, the corporation must accept the effective date specified. Except upon notice to the Attorney General, no Director may resign where the corporation would then be left without a duly elected Director or Directors in charge of its affairs. If the resignation is effective at a future time, a successor may be elected to take office when the resignation becomes effective.

Section 8. Removal.

A. The Board of Directors may declare vacant the office of a Director who has: (a) become subject to an entry by a court of competent jurisdiction that appoints a guardian or conservator for the Director or estate of the Director; (b) been convicted of a felony; or (c) been found by a final order or judgment of a court of competent jurisdiction to have breached any duty under California Corporations Code ("Corporations Code") Sections 5230 through 5239 or any successor provisions thereto.

B. Any or all Directors may be removed by the Board of Directors, with or without cause.

C. No reduction of the authorized number of Directors shall have the effect of removing any Director prior to the expiration of such Director's term of office.

Section 9. Compensation; Expense Reimbursement.

The corporation shall pay members of the Board of Directors a fee fixed by resolution of the Board for each meeting they attend. The fee shall be fixed from time to time by resolution of the Board. Directors shall receive no other compensation or expense reimbursement for attending meetings of the Board of Directors. The Board may, however, authorize reimbursement for such actual expenses paid while acting on behalf of the corporation as may be determined by the Board be just and reasonable.

Section 10. Conflict of Interest.

In accordance with the provisions of that certain Implementation Agreement for the Natomas Basin Habitat Conservation Plan, dated December 8, 1997, and entered into by and between the USFWS, CDFG, the City of Sacramento and the corporation as of December 31, 1997 ("Implementation Agreement"), Directors and employees of the corporation shall be subject to and shall comply with the provisions set forth in Code Section 1090 et seq.

In addition, in furtherance of the provisions of the Implementation Agreement, the corporation has voluntarily approved and adopted a Conflict of Interest Code ("Conflict Code") that is identical to the requirements and provisions set forth in the

Political Reform Act, Code Section 81000 et seq., and the regulations adopted by the Fair Political Practices Commission, Title 2, California Code of Regulations, Section 18730. A copy of the Conflict Code shall be maintained in the offices of the corporation, and shall be available for public inspection and reproduction in accordance with Article X, Section 5 of these Bylaws. All Directors and employees of the corporation shall be subject to and shall comply with the requirements and provisions set forth in the Conflict Code, including without limitation the disclosure and reporting requirements set forth in the Conflict Code.

Section 11. Inspection by Directors.

Every Director shall have the absolute right at any reasonable time to inspect the corporation's books, records, documents of every kind, physical properties, and the records of each of its subsidiaries, if any. The inspection may be made in person or by the Director's agent or attorney. The right of inspection includes the right to copy and make extracts of documents.

ARTICLE VI
COMMITTEES

Section 1. Executive Committee.

There may be an Executive Committee of the Board of Directors comprised of three (3) Directors appointed by a majority of the Directors then in office, which shall have all the authority of the Board, except with respect to those matters specified in Section 3 of this Article VI of these Bylaws. The Executive Committee of the Board shall consist of the Chair of the Board or if none and the President is a Director, the President and two (2) other Directors. The Chair of the Board (or President) shall serve as Chair of the Executive Committee and in his or her absence a Vice Chair shall be appointed to serve. Committee Chairs of other special committees created by the Board, if any, will report to the Executive Committee on a regular basis. Committee Chairs are nominated by the Chair (or President) and appointed by the Board. The Executive Director of the corporation shall serve as a nonvoting member of the Executive Committee.

Section 2. Special Committee.

The Board of Directors, by resolution adopted by a majority of the Directors then in office, provided a quorum is present, may create one (1) or more special committees, each consisting of two (2) or more Directors to serve at the pleasure of the Board. Any such special committee shall have such authority of the Board as provided in the Board resolution, except that no committee, regardless of Board resolution, may take any action proscribed by Section 3 of this Article VI of these Bylaws.

Section 3. Proscribed Committee Actions.

Regardless of any Board resolution, no committee of the Board, including the Executive Committee, shall have the authority to do any of the following:

- (a) Fill vacancies on the Board or on any committee that has the authority of the Board;

- (b) Fix compensation of the Directors for serving on the Board or on any committee;
- (c) Amend or repeal Bylaws or adopt new Bylaws;
- (d) Amend or repeal any resolution of the Board that by its express terms is not so amendable or repealable;
- (e) Create any other committees of the Board or appoint the members of a committee of the Board; or
- (f) Approve any contract or transaction to which the corporation is a party and in which one (1) or more of its Directors have a material financial interest, except as special approval is provided for in Corporations Code Section 5233(d)(3).

Section 4. Committee Members.

Appointments to special committees shall be by a majority vote of the Board of Directors then in office.

Section 5. Meetings and Actions of Committees.

Meetings and actions of committees of the Board shall be governed by, held and taken in accordance with the provisions of these Bylaws concerning meetings and Board actions, except that regular meetings of such committees and the calling of special meetings of such committees may be determined either by Board resolution or, if there is none, by resolution of the committee of the Board. Minutes of each meeting of any committee of the Board shall be kept and filed with the corporate records. The Board may adopt rules for the government of any committee, provided they are consistent with these Bylaws, or, in the absence of rules adopted by the Board, the committee may adopt such rules.

Section 6. Term of Office of Committee Members.

Each committee member shall serve at the pleasure of the Board of Directors but not to exceed such committee member's term as a Director.

Section 7. Technical Advisory Council.

The Board of Directors shall be counseled by a Technical Advisory Council which shall assist it in matters of policy and habitat management for the lands controlled by the corporation. The Technical Advisory Council shall have at least one (1) member appointed by the USFWS, at least one (1) member appointed by the Region II Manager of CDFG, and at least one (1) member appointed to represent the public interest by the Board of Directors. The Technical Advisory Council shall make recommendations and provide guidance to the Board of Directors on the following topics: acquisition of habitat mitigation lands, in fee and by way of conservation easements; pursuit of funding from state and federal grant programs; pursuit of grants from private foundations and other nongovernmental sources; the creation of policies to guide

habitat restoration and enhancement activities; administration of the Implementation Agreement for the Natomas Basin Habitat Conservation Plan; and management and income generating activities on lands owned or controlled by the corporation. Members of the Technical Advisory Council may be reimbursed in such amounts as may be determined from time to time by the Board of Directors to be just and reasonable for expenses paid while acting on behalf of the corporation.

ARTICLE VII

OFFICERS

Section 1. Officers of the Corporation.

The officers of this corporation shall be a President, a Vice President, a Secretary, and a Chief Financial Officer. The corporation may also have, at the discretion of the Board of Directors, a Chair of the Board, one (1) or more additional Vice Presidents, one (1) or more Assistant Secretaries, and such other officers as may be appointed in accordance with the provisions of Section 3. Any number of offices may be held by the same person; provided, however, that neither the Secretary nor the Chief Financial Officer may serve concurrently as the President or Chair of the Board.

Section 2. Election.

The Board of Directors shall elect officers of the corporation at the annual meeting. Officers shall serve at the pleasure of the Board, subject to the rights, if any, of any officer engaged under any contract of employment. The Board may appoint and may authorize the Chair of the Board, the President, or other officer, to appoint any other officers that the corporation may require. Each officer so appointed shall have the title, hold office for the period, have the authority, and perform the duties specified in these Bylaws or as determined by the Board. Officers need not be chosen from among the Directors.

Section 3. Subordinate Officers.

The Board of Directors may appoint such other officers as the business of the corporation may require, each of whom shall hold office for such period, have such authority and perform such duties as are required in these Bylaws or as the Board of Directors may from time to time determine.

Section 4. Removal.

Without prejudice to any rights of an officer under any contract of employment, any officer may be removed with or without cause by the Board, and, if the officer was not chosen by the Board, by any officer on whom the Board may confer the power of removal.

Section 5. Resignation.

Any officer may resign at any time by giving written notice to the corporation, subject to the rights, if any, of the corporation under any contract to which the officer is a party. Any such resignation shall take effect at the date of the receipt of such notice or

at any later time specified therein; and, unless otherwise specified therein, the acceptance of such resignation shall not be necessary to make it effective.

Section 6. Vacancies.

A vacancy in any office because of death, resignation, removal, disqualification or otherwise shall be filled in the manner prescribed in these Bylaws for regular appointments to that office.

Section 7. Responsibilities of Officers.

A. Chair of the Board. The Chair of the Board, if there shall be such an officer, shall, if present, preside at meetings of the Executive Committee and the Board of Directors, and exercise and perform such other powers and duties as, from time to time may be assigned to him or her by the Board of Directors or prescribed by the Bylaws.

B. President. The President shall have the general powers and duties usually vested in the office of president of a corporation and shall have such other powers and duties as may be prescribed by the Board or these Bylaws. In the absence of the Chair of the Board or if there is no Chair, the President shall preside at all meetings of the Board of Directors. Further, in the absence of the designation of a Chief Executive Officer of the corporation, the President shall be the Chief Executive Officer and shall, subject to the control of the Board of Directors, have general supervision, direction and control of the business and officers of the corporation.

C. Vice President. If the President is absent or disabled, the Vice President, if any, shall perform all duties of the President. When so acting, a Vice President shall have all of the powers of and be subject to all restrictions on the President. The Vice President shall have such other powers and perform such other duties as may be prescribed by the Board or these Bylaws.

D. Secretary. The Secretary shall keep a full and complete record of all meetings and actions of the Board and committees of the Board, and shall keep the seal of the corporation (if any) and affix the same to such papers and instruments as may be required in the regular course of business, shall make service of such notice as may be necessary or proper, and shall supervise the keeping of the corporate records of the corporation. The Secretary shall have such other powers and perform other duties as may be prescribed by the Board or these Bylaws.

E. Chief Financial Officer. The Chief Financial Officer shall receive and safely keep all funds of the corporation and deposit the same in such financial institution(s) as may be designated by the Board. Such funds shall be paid out only on the check of the corporation signed by such person or persons as may be designated by the Board as authorized to sign the same. The Chief Financial Officer shall have such other powers and perform other duties as may be prescribed by the Board or these Bylaws.

F. Assistant Secretary. The Assistant Secretary, if there shall be such an officer, shall have all the powers and perform all the duties of the Secretary in the absence or inability of the Secretary to act.

G. Executive Director. The Board shall select and appoint an individual to act as the Executive Director of the corporation. The Executive Director shall be responsible for implementing and administering the policies and decisions of the Board of Directors and managing the affairs of the corporation in harmony with the policies and goals of the Natomas Basin Habitat Conservation Plan. The Executive Director shall have such other powers and perform such other duties as may be prescribed by the Board.

H. Compensation. The compensation, if any, of the officers who are also employees of the corporation shall be fixed from time to time by the Board of Directors, and no officer shall be prevented from receiving such compensation because the officer is also a Director of the corporation.

ARTICLE VIII INDEMNIFICATION

Section 1. Right of Indemnification.

A. For the purposes of this Section 1, "agent" means any person who is or was a Director, officer, employee or other agent of the corporation, or is or was serving at the request of the corporation as a director, officer, employee or agent of another foreign or domestic corporation, partnership, joint venture, trust or other enterprise, or was a director, officer, employee or agent of a foreign or domestic corporation which was a predecessor corporation of the corporation or of another enterprise at the request of such predecessor corporation; "proceeding" means any threatened, pending or completed action or proceeding, whether civil, criminal, administrative or investigative; and "expenses" includes, without limitation, attorneys' fees and any expenses of establishing a right to indemnification under these Bylaws.

B. The corporation shall, to the fullest extent permitted by law, indemnify any person who was or is a party or is threatened to be made a party to any proceeding (other than an action by or in the right of the corporation to procure a judgment in its favor, an action brought under Corporations Code Section 5233, or an action brought by the Attorney General or a person granted relator status by the Attorney General for any breach of duty relating to assets held in charitable trust) by reason of the fact that such person is or was an agent of the corporation, against expenses, judgments, fines, settlements and other amounts actually and reasonably incurred in connection with such proceeding if such person acted in good faith and in a manner which such person reasonably believed to be in the best interests of the corporation and, in the case of a criminal proceeding, had no reasonable cause to believe the conduct of such person was unlawful. The termination of any proceeding by judgment, order, settlement, conviction or upon a plea of nolo contendere, or its equivalent, shall not, of itself, create a presumption that the person did not act in good faith and in a manner which the person reasonably believed to be in the best interests of the corporation or that the person had reasonable cause to believe that the person's conduct was unlawful.

C. The corporation shall have power to indemnify any person who was or is a party or is threatened to be made a party to any threatened, pending or completed action by or in the right of the corporation, or brought under Corporations Code Section 5233, or brought by the Attorney General or a person granted relator status by

the Attorney General for a breach of duty relating to assets held in charitable trust, to procure a judgment in its favor by the corporation, against expenses actually and reasonably incurred by such person in connection with the defense or settlement of such action if such person acted in good faith, in a manner such person believed to be in the best interests of the corporation and with such care, including reasonable inquiry, as an ordinarily prudent person in a like position would use under similar circumstances. No indemnification shall be made under this Section 1.C:

- (1) In respect of any claim, issue or matter as to which such person shall have been adjudged to be liable to the corporation in the performance of such person's duty to the corporation, unless and only to the extent that the court in which such proceeding is or was pending shall determine upon application that, in view of all the circumstances of the case, such person is fairly and reasonably entitled to indemnity for the expenses which such court shall determine;
- (2) Of amounts paid in settling or otherwise disposing of a threatened or pending action, with or without court approval; or
- (3) Of expenses incurred in defending a threatened or pending action which is settled or otherwise disposed of without court approval unless it is settled with the approval of the Attorney General.

D. To the extent that an agent of the corporation has been successful on the merits in defense of any proceeding referred to in Section 1.B or Section 1.C above, or in defense of any claim, issue or matter therein, the agent shall be indemnified against expenses actually and reasonably incurred by the agent in connection therewith.

E. Except as provided in Section 1.D above, any indemnification under this Section 1 shall be made by the corporation only if authorized in the specific case, upon a determination that indemnification of the agent is proper in the circumstances because the agent has met the applicable standard of conduct set forth in Section 1.B or Section 1.C, above, by:

- (1) A majority vote of a quorum consisting of Directors who are not parties to such proceeding; or
- (2) The court in which such proceeding is or was pending upon application made by the corporation or the agent or the attorney or other person rendering services in connection with the defense, whether or not such application by the agent, attorney or other person is opposed by the corporation.

F. No indemnification or advance shall be made under this Section 1, except as provided in Section 1.D or Section 1.E(2) above, in any circumstance where it appears that:

- (1) It would be inconsistent with a provision of the Articles, the Bylaws or an agreement in effect at the time of the occurrence of the alleged cause of action asserted in the proceeding in which the

expenses were incurred or other amounts were paid, which prohibits or otherwise limits indemnification; or

- (2) It would be inconsistent with any condition expressly imposed by a court in approving a settlement.

Section 2. Advancement of Expenses.

To the fullest extent permitted by law, and except as otherwise determined by the Board in a specific instance, expenses incurred by a person seeking indemnification under these Bylaws in defending any proceeding shall be advanced by the corporation before final disposition of the proceeding, on receipt by the corporation of an undertaking by or on behalf of that person that the advance will be repaid unless it is ultimately determined that the person is entitled to be indemnified by the corporation for those expenses.

Section 3. Insurance.

The corporation shall have the right to purchase and maintain insurance to the fullest extent permitted by law on behalf of its Directors, officers, employees, and other agents, against any liability asserted against or incurred by any Director, officer, employee, or agent in such capacity or arising out of the Director's, officer's, employee's, or agent's status as such; provided, however, that the corporation shall have no power to purchase and maintain such insurance to indemnify any agent of the corporation for a violation of Corporations Code Section 5233 (relating to self-dealing transactions).

ARTICLE IX

AMENDMENT OF BYLAWS

These Bylaws may be amended or repealed and new Bylaws adopted by the affirmative vote of the majority of the members of the Board of Directors at any Board meeting; except that a Bylaw fixing or changing the number of Directors may be adopted, amended or repealed only by the vote or written consent of the majority of the Directors of the corporation.

ARTICLE X

RECORDS AND REPORTS

Section 1. Books and Records.

The corporation shall keep adequate and correct books and records of account and written minutes of the proceedings of its Board of Directors and its committees. At its principal place of business, the corporation shall keep the original or a copy of its Articles of Incorporation and Bylaws, as amended to date.

Section 2. Form of Records.

Minutes shall be kept in written form. Other books and records shall be kept either in written form or in any other form capable of being converted into written

form. If any record subject to inspection pursuant to the Corporations Code is not maintained in written form, a request for inspection is not complied with unless and until the corporation, at its expense, makes such record available in written form.

Section 3. Annual Report.

The Board of Directors shall cause the corporation to prepare an annual report within one hundred twenty (120) days after the end of the corporation's fiscal year. Such annual report shall be sent to the City Manager of the City of Sacramento, the County Executive of the County of Sacramento, the County Executive of the County of Sutter, the Regional Director of USFWS, the Regional IX Manager of CDFG, the Executive Director of Reclamation District 1000, the President of the Natomas Mutual Water Company, the Executive Director of the Pleasant Grove Water District, the Executive Director of the Pleasant Grove Community Services District, and the Director of the Sacramento Area Flood Control Agency. In addition to any other matters which the Board of Directors may require to be included in the Annual Report, such report shall contain the following information, in appropriate detail, for the fiscal year:

- (a) The assets and liabilities of the corporation as of the end of the fiscal year;
- (b) The principal changes in assets and liabilities;
- (c) The revenue or receipts of the corporation, both restricted and unrestricted;
- (d) The amount of any charitable donations to the corporation;
- (e) The expenses and disbursements of the corporation for both general and restricted purposes.

The annual report shall be accompanied by a report on it prepared by independent accountants or, if there is no such accountants' report, by the certificate of the President and Secretary of the corporation that the annual report was prepared without audit from the corporation's books and records.

This requirement of an annual report shall not apply if the corporation receives less than Twenty-Five Thousand Dollars (\$25,000) in gross receipts during the fiscal year; provided, however, that the information specified above for inclusion in an annual report must be furnished annually to all Directors and to the other specified parties above.

Section 4. Statement of Transactions and Indemnifications.

As part of the annual report described above, the corporation shall annually prepare a statement of any transaction or indemnification of the following kind within one hundred twenty (120) days after the end of the corporation's fiscal year:

- (a) Any transaction: (i) in which the corporation, or its subsidiary, if any, was a party; (ii) in which an "interested person" (as defined by Corporations Code Section 5227) had a direct or indirect material financial interest; and (iii) which involved more than Fifty Thousand Dollars (\$50,000), or was

one of a series of transactions with the same interested person involving, in the aggregate, more than Fifty Thousand Dollars (\$50,000), during the fiscal year.

- (b) Any indemnifications or advances aggregating more than Ten Thousand Dollars (\$10,000) paid during the fiscal year to any officer or Director of the corporation under these Bylaws.

Section 5. California Public Records Act Requirements.

Public records shall be open to inspection at all times during the office hours of the corporation for inspection by any person as required by the California Public Records Act (Code § 6250 et seq.). Any reasonably agreeable portion of a record shall be available for inspection by any person requesting the record after deletion of the portions that are exempted by law, provided, however, that any documents relating to real property transactions, either pending or completed, of NBC shall be exempt from disclosure. As used herein, "real property transactions" shall include options to purchase or lease, purchases and leases of real property, as well as farming contracts affecting real property that NBC has acquired or is negotiations to acquire. This exemption from disclosure shall only apply if the applicable HCPs and IAs have been amended to provide for this exception.

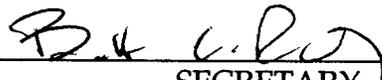
Except with respect to public records exempt from disclosure by express provisions of law, the corporation, upon a request for a copy of records that reasonably describes an identifiable record or records, shall make the records promptly available to any person, upon payment of fees covering direct costs of duplication, or a statutory fee, if applicable. Upon request, an exact copy shall be provided unless impracticable to do so. Computer data shall be provided in a form determined by the corporation.

"Public records" includes any writing containing information relating to the conduct of the public's business prepared, owned, used or retained by the corporation regardless of physical form or characteristics.

CERTIFICATE OF SECRETARY

I certify that I am the duly elected and acting Secretary of The Natomas Basin Conservancy, a California Non-Profit Public Benefit Corporation, that the above Amended and Restated Bylaws, consisting of twenty-one (21) pages, are the Bylaws of this corporation as adopted by the Board of Directors on May 3, ~~1999~~²⁰⁰⁰, and that they have not been amended or modified since that date.

Executed on November 8, 2000, at Sacramento, California.



SECRETARY

Appendix G

Pacific Region, USFWS and ACOE,
Biological Opinion for 404 Permitted
Projects with Relatively Small Effects to
Vernal Pools, dated February 1996.

Outdated information has been corrected or deleted.

Programmatic consultation is suspended in San Joaquin Valley except where there are approved HCPs (habitat conservation plans).

U.S. Fish and Wildlife Service
Sacramento Fish and Wildlife Office
2800 Cottage Way, Room W-2605
Sacramento, California 95825

In Reply Refer To:
1-1-96-F-1

February 28, 1996

Mr. Art Champ
Regulatory Branch
Department of the Army
U.S. Army Engineer District, Sacramento
Corps of Engineers
Sacramento, CA 95814-2922

Subject: Programmatic Formal Endangered Species Act Consultation on Issuance of 404 Permits for Projects with Relatively Small Effects on Listed Vernal Pool Crustaceans Within the Jurisdiction of the Sacramento Field Office, California

Dear Mr. Champ:

This document serves as a programmatic formal consultation document pursuant to section 7 of the Endangered Species Act of 1973, as amended (Act), on issuance of Clean Water Act section 404 permits for projects with limited environmental impacts on vernal pools within the jurisdiction of the Sacramento Field Office (SFO) of the U.S. Fish and Wildlife Service (Service). The issues addressed in this document are the effects of these projects on the endangered Conservancy fairy shrimp (*Branchinecta conservatio*), longhorn fairy shrimp (*Branchinecta longiantenna*), vernal pool tadpole shrimp (*Lepidurus packardi*), and/or the threatened vernal pool fairy shrimp (*Branchinecta lynchi*). These animals (species) were listed on September 19, 1994 (59 **FR** 48136). This consultation document has been prepared pursuant to 50 CFR 402 of our interagency regulations governing section 7 of the Act.

The purpose of this programmatic consultation document is to expedite consultations on proposed projects with relatively small impacts on listed species. Future projects that meet the conditions specified below, or that the SFO determines will have similar impacts, may be appended to this consultation document. Contributions from the State resources agencies, U.S. Army Corps of Engineers (Corps), and U.S. Environmental Protection Agency have aided the development of this consultation document. Continued assistance of these entities in implementing its provisions will facilitate the purpose of streamlining the consultation process.

This consultation document is based on information provided in biological assessments and biological data reports submitted to the SFO by the Corps. Information obtained during site visits and meetings between members of my staff, Corps personnel, applicants, and other Federal and State entities has also been used. These meetings resulted in the development of appropriate mitigation measures that are outlined in the Description of the Proposed Action section below.

This document supersedes the Service's prior programmatic consultation document on vernal pool crustaceans dated April 4, 1995. The Service will reevaluate the effectiveness of this programmatic consultation at least every six (6) months to ensure that continued implementation will not result in unacceptable effects on the ecosystem upon which the listed species depend. This opinion may be modified during reevaluation to alleviate excessive effects on listed species or problems with the programmatic process.

BIOLOGICAL OPINION

Description of the Proposed Action

This consultation collectively covers projects with small effects on listed vernal pool crustaceans in the Sacramento Basin of California. For the purposes of this consultation, all applicants will have either surveyed habitat of these species (habitat) and confirmed the presence of listed species, or chosen to assume that all potential habitat contains listed species.

Habitat is considered to include any areas that seasonally pond water in which one or more of the listed vernal pool species could exist. Such areas include, but may not be restricted to, vernal pools and swales. Vernal pools and swales are ephemeral wetlands that typically form in shallow depressions underlain by a substrate near the surface that restricts the percolation of water. They are characterized by a barrier to overland flow that causes water to collect and pond. These depressions fill with rainwater and runoff from adjacent areas during the winter and may remain inundated until spring or early summer, sometimes filling and emptying more than once during the wet season. Vernal pools and swales are frequently clustered into assemblages known as vernal pool complexes. Individual pools within a vernal pool complex are mutually interdependent in supporting listed vernal pool species; when a species is extirpated from an individual pool, other pools in the complex may serve as recolonization sources. Upland habitat and swales around and within a vernal pool complex are essential to the hydrological and biological integrity of the complex.

All projects implemented under this programmatic consultation will meet the following conditions or will be determined by the Service to have impacts similar in nature:

1. Less than one acre of habitat will be affected, including habitat filled or otherwise destroyed (directly affected) and habitat indirectly affected by the proposed action.

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

2. Projects proposed in areas with known populations of the Conservancy fairy shrimp or longhorn fairy shrimp (in Butte, Tehama, Solano, Glenn, Merced, San Luis Obispo, and Contra Costa Counties) will not proceed until the Corps has initiated consultation and the Service has reviewed the proposed projects to ensure that impacts to these species are adequately mitigated.
3. Projects with listed or proposed plant species will undergo individual review, but, upon determination by the Service, may be included as part of this consultation.

Projects that are not consistent with these conditions may be appended to this biological opinion only as the Service deems appropriate. For example, a project that affects 5 acres of habitat, but has effects similar in scope and nature to those analyzed in this biological opinion, may be appended in the future. If the project is implemented in a manner consistent with the process described within this biological opinion, take resulting from implementation of the proposed project may be permitted.

The impacts of projects that will be authorized under this biological opinion on vernal pool species will be minimized as follows:

- A. **Preservation component.** For every acre of habitat directly or indirectly affected, at least two vernal pool credits will be dedicated within a Service-approved ecosystem preservation bank, or, based on Service evaluation of site-specific conservation values, three acres of vernal pool habitat may be preserved on the project site or on another non-bank site as approved by the Service (Table 1).
- B. **Creation component.** For every acre of habitat directly affected, at least one vernal pool creation credit will be dedicated within a Service-approved habitat mitigation bank, or, based on Service evaluation of site-specific conservation values, two acres of vernal pool habitat will be created and monitored on the project site or on another non-bank site as approved by the Service (Table 1).

Table 1. Mitigation ratios for credits dedicated in Service-approved mitigation banks or for acres of habitat outside of mitigation banks.

	bank	non-bank
preservation	2:1	3:1
creation	1:1	2:1

Mitigation ratios for non-bank mitigation may be adjusted to approach those for banks if the Service considers the conservation value of the non-bank mitigation area to approach that of Service-approved mitigation banks.

For non-natural habitat (habitat created *de novo* by human activity), habitat that is significantly altered and without restoration potential, and habitat indirectly affected by agricultural practices, mitigation may be adjusted. Certain agricultural practices have no adverse effect on vernal pool habitat and therefore may be entirely exempt from mitigation. In particular, low intensity grazing may approximately reproduce the natural conditions to which vernal pool crustaceans are adapted (i.e., prehistoric grazing by native herbivores). Consequently, such levels of grazing incur neither the creation nor the preservation component of mitigation.

- C. Vernal pool habitat and associated upland habitat used as on-site mitigation will be protected from adverse impacts and managed in perpetuity or until the Corps, the applicant, and the Service agree on a process to exchange such areas for credits within a Service-approved mitigation banking system.
- D. If habitat is avoided (preserved) on site, then a Service-approved biologist (monitor) will inspect any construction-related activities at the proposed project site to ensure that no unnecessary take of listed species or destruction of their habitat occurs. The biologist will have the authority to stop all activities that may result in such take or destruction until appropriate corrective measures have been completed. The biologist also will be required to report immediately any unauthorized impacts to the Service and the California Department of Fish and Game.
- E. Adequate fencing will be placed and maintained around any avoided (preserved) vernal pool habitat to prevent impacts from vehicles.
- F. All on-site construction personnel will receive instruction regarding the presence of listed species and the importance of avoiding impacts to these species and their habitat.
- G. The applicant will ensure that activities that are inconsistent with the maintenance of the suitability of remaining habitat and associated on-site watershed are prohibited. This includes, but is not limited to (i) alteration of existing topography or any other alteration or uses for any purposes, including the exploration for or development of mineral extraction; (ii) placement of any new structures on these parcels; (iii) dumping, burning, and/or burying of rubbish, garbage, or any other wastes or fill materials; (iv) building of

any new roads or trails; (v) killing, removal, alteration, or replacement of any existing native vegetation; (vi) placement of storm water drains; (vii) fire protection activities not required to protect existing structures at the project site; and (viii) use of pesticides or other toxic chemicals.

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

- H. Before implementation of each proposed project, the Service will be supplied with a 7.5 minute U. S. Geological Survey topographic map that clearly delineates the project area and habitat contained within this area.
- I. The Service will implement a tracking system to ensure that the total amount of listed crustacean habitat affected by projects permitted under this consultation is not so great that it jeopardizes the listed crustacean species in any county within the jurisdiction of the SFO. The Service is conducting a county-by-county survey to determine the extent of existing habitat of listed vernal pool crustaceans. Pending completion of that survey, the Service will ensure that no more than fifty [50] acres of listed crustacean habitat are filled per county, from the date of issuance of this consultation prior to completion of reinitiated formal consultation.

Limiting this programmatic consultation to projects involving relatively minor impacts will minimize effects on the listed vernal pool crustaceans and their habitat. Through the tracking of project impacts over time, effects will be further minimized at local and regional levels.

The emphasis in this programmatic biological opinion on mitigating in ecosystem mitigation banks is justified for projects that meet the conditions listed above, because generally the isolated pools and small complexes to be affected are expected to be less ecologically stable than pools that are part of the larger complexes in mitigation banks. Chance extinctions are more likely to occur in isolated pools and small complexes than in larger complexes. Such stochastic extinctions can result in lower species diversity if they are not balanced by recolonization. In addition, waterfowl are thought to be an important dispersal vehicle for cysts, especially over great distances (e.g., between vernal pool complexes). Large preserve areas are likely to be more attractive to larger numbers of these species.

The use of a habitat banking system has several additional advantages. By combining the mitigation of many applicants, an economy of scale is achieved (i.e., project mitigations have overlapping buffer zones and shared costs of monitoring; larger preserve areas that can maintain the integrity of the ecosystem, are created).

Creation and preservation areas will be established within each county. Thus, it will be assured that mitigation will occur in the same general areas as the destruction, and that local planning

efforts will have foundations for conservation planning efforts appropriate for the level of destruction that occurs during the short-term.

The option of on-site mitigation also is included in this biological opinion because of the potential importance of maintaining some remnant of the historic distribution of vernal pool clusters outside of large vernal pool mitigation banks. If these intervening "islands" of habitat are large enough and adequately protected, they may serve as "stepping stones," enabling listed species to disperse and recolonize between the major vernal pool complexes that will be preserved in banks. Such stepping stones may be especially important if wind plays a role in the dispersal of the cysts of listed crustacean species, because wind is probably only effective as a dispersal agent over short distances. An array of on-site reserves, if they are large enough to sustain populations, also may serve to maintain the full range of intraspecific genetic diversity better than reliance solely on a relatively few large reserves. A larger number of reserves also may provide better insurance against local natural disasters, disease, and predation (Simberloff and Abele 1976 and 1982; Quinn and Robinson 1987; Quinn and Hastings 1987).

The comprehensive review of the baseline (the number and location of acres destroyed within each county) that will be conducted at the end of each six-month period will limit the extent of impacts that occur as a result of the implementation of this opinion. During these reviews it may be determined that habitat destruction can continue with the same or otherwise necessary mitigation processes in place, or that further destruction in specific areas will jeopardize listed species. The Service will work closely with recovery efforts to ensure that created and preserved areas are distributed across the landscape in such a manner as to allow them to function effectively.

The following process will be used when implementing proposed projects under this biological opinion:

1. After reviewing the permit request, the Corps will forward to the Sacramento Field Office all biological and other pertinent information along with a letter requesting that the proposed project be appended to this biological opinion;
2. The Service will review the proposed project to determine appropriate mitigation.
3. The Service will deliver to the Corps a letter specifying measures that will adequately mitigate for the impacts of the proposed project (note that this could entail the approval of the applicant's proposed mitigation). Also, the Service will designate a staff biologist to serve as the contact regarding the proposed project.
4. The Corps will forward the above letter to the applicant, approving the applicant's mitigation plan, or presenting the mitigation requirements and instructing the applicant to contact the Service's staff biologist for assistance in fulfilling the applicant's mitigation responsibilities.

5. After the mitigation responsibilities are fulfilled, the Service will forward a letter to the Corps describing habitat monitoring requirements (if any) and stating that the proposed project is in compliance with requirements of the Act.

Species Accounts

Descriptions of the Conservancy fairy shrimp, longhorn fairy shrimp, vernal pool tadpole shrimp, and the vernal pool fairy shrimp are found in 59 FR 48136, the publication of the final rule to list these species under the Act. These crustaceans are restricted to vernal pools, swales, and other seasonal pools in California. Eng *et al.* (1990) and Simovich *et al.* (1992) provide further details on the life history and ecology of the Conservancy fairy shrimp, longhorn fairy shrimp, vernal pool tadpole shrimp, and the vernal pool fairy shrimp.

Fairy shrimp have delicate elongate bodies, large stalked compound eyes, no carapace, and 11 pairs of swimming legs. They swim or glide gracefully upside down by means of complex beating movements of the legs that pass in a wavelike, anterior-to-posterior direction. Nearly all fairy shrimp feed on algae, bacteria, protozoa, rotifers, and bits of detritus. The females carry the eggs in an oval or elongate ventral brood sac. The eggs are either dropped to the pool bottom or remain in the brood sac until the female dies and sinks. The "resting" or "summer" eggs are known as "cysts." They are capable of withstanding heat, cold, and prolonged desiccation. When the pools refill in the same or subsequent seasons, some, but not all, of the cysts may hatch. The cyst bank in the soil may comprise the cysts from several years of breeding. The cysts hatch when the vernal pools fill with rainwater. The early stages of the fairy shrimp develop rapidly into adults. These non-dormant populations often disappear early in the season long before the vernal pools dry up.

The Conservancy fairy shrimp inhabits vernal pools with highly turbid water. The species is known from six disjunct populations: Vina Plains, north of Chico, Tehama County; south of Chico, Butte County; Jepson Prairie, Solano County; Sacramento National Wildlife Refuge, Glenn County; near Haystack Mountain northeast of Merced in Merced County; and the Lockwood Valley of northern Ventura County.

The longhorn fairy shrimp inhabits clear to turbid grass-bottomed vernal pools in grasslands and clear-water pools in sandstone depressions. This species is known only from four disjunct populations along the eastern margin of the central coast range from Concord, Contra Costa County south to Soda Lake in San Luis Obispo County: the Kellogg Creek watershed, the Altamont Pass area, the western and northern boundaries of Soda Lake on the Carrizo Plain, and Kesterson National Wildlife Refuge in the San Joaquin Valley.

The vernal pool fairy shrimp inhabits vernal pools with clear to tea-colored water, most commonly in grass or mud bottomed swales, or basalt flow depression pools in unplowed grasslands. The vernal pool fairy shrimp has been collected from early December to early May. There are 32 known populations of the vernal pool fairy shrimp, extending from Stillwater Plain

in Shasta County through most of the length of the Central Valley to Pixley in Tulare County, and along the central coast range from northern Solano County to Pinnacles National Monument in San Benito County. Four additional, disjunct populations exist: one near Soda Lake in San Luis Obispo County, one in the mountain grasslands of northern Santa Barbara County, one on the Santa Rosa Plateau in Riverside County, and one near Rancho California in Riverside County.

The vernal pool tadpole shrimp has dorsal compound eyes, a large shield-like carapace that covers most of the body, and a pair of long cercopods at the end of the last abdominal segment. Tadpole shrimp climb or scramble over objects, as well as plow along or in bottom sediments. Their diet consists of organic detritus and living organisms, such as fairy shrimp and other invertebrates. The vernal pool tadpole shrimp is known from 18 populations in the Central Valley, ranging from east of Redding in Shasta County south to the San Luis National Wildlife Refuge in Merced County, and from a single vernal pool complex located on the San Francisco Bay National Wildlife Refuge in the City of Fremont, Alameda County. This animal inhabits vernal pools containing clear to highly turbid water, ranging in size from 54 square feet in the former Mather Air Force Base area of Sacramento County, to the 89-acre Olcott Lake at Jepson Prairie. The life history of the vernal pool tadpole shrimp is linked to the phenology of the vernal pool habitat. After winter rainwater fills the pools, the populations are reestablished from diapaused cysts which lie dormant in the dry pool sediments. Sexually mature adults have been observed in vernal pools three to four weeks after the pools had been filled. Some of the cysts hatch immediately and the rest enter diapause and remain in the soil to hatch during later rainy seasons.

The listed species of fairy shrimp and tadpole shrimp are imperiled by habitat loss caused by a variety of human-caused activities, primarily urban development, water supply/flood control projects, and conversion of land to agricultural use. Only a small proportion of the habitat of these species is protected from these threats. State and local laws and regulations have not been passed to protect these species, and other regulatory mechanisms necessary for the conservation of the habitat of these species have proven ineffective.

Environmental Baseline

Holland (1978) estimated that between 60 and 85 percent of the habitat that once supported vernal pools, the endemic habitat of the vernal pool fairy shrimp, had been destroyed by 1973. In the ensuing twenty-one years, a substantial amount of remaining habitat has been converted for human uses. The rate of loss of vernal pool habitat in the state has been estimated at two to three percent per year (Holland and Jain 1988). Rapid urbanization of the Central Valley of California currently poses the most severe threat to the continued existence of the listed vernal pool crustaceans. The Sacramento District of the U. S. Army Corps of Engineers has several thousand vernal pools under its jurisdiction (Coe 1988), which includes most of the known populations of these listed species. It is estimated that within 20 years 60 to 70 per cent of these will be destroyed by human activities (Coe 1988).

The habitat of the listed vernal pool crustaceans is highly fragmented throughout their ranges due to conversion of natural habitat for urban and agricultural uses. This fragmentation results in small isolated fairy shrimp populations. Ecological theory predicts that such populations will be highly susceptible to extinction due to chance events, inbreeding depression, or additional environmental disturbance (Gilpin and Soule 1986; Goodman 1987*a,b*). Should an extinction event occur in a population that has been fragmented, the opportunities for recolonization are thought to be greatly reduced due to physical (geographical) isolation from other (source) populations.

In accordance with measure I on page five of this biological opinion, the Service has been tracking losses of habitat permitted under this consultation in each county under the jurisdiction of the SFO and within the ranges of the listed crustaceans covered by this consultation. A summary of the results is displayed in Table 2 below.

Table 2. Amount of habitat of listed vernal pool crustaceans that has been permitted for fill under this programmatic consultation since its issuance on April 4, 1995, until February 14, 1996.

County	Acres of Habitat Destroyed
Shasta	0
Tehama	0
Plumas	0
Butte	0.02
Glenn	0
Colusa	0
Sutter	0
Placer	3.378
Yolo	0
Sacramento	3.9
Solano	0.55
San Joaquin	0
Contra Costa	0
Stanislaus	0

Tuolumne	0
Mariposa	0
Merced	0
Madera	0
Fresno	0
Kings	0
Tulare	0
Kern	0
San Luis Obispo	0
TOTAL	7.848

Effects of the Proposed Action

Direct effects

Individuals of listed crustaceans and their cysts may be directly injured or killed by activities leading to the destruction (i.e., the filling of habitat) of the pools in which they exist. The proposed action may directly affect all listed vernal pool crustaceans associated with up to 50 acres of habitat in each of the following counties: Shasta, Tehama, Plumas, Butte, Glenn, Colusa, Sutter, Placer, Yolo, Sacramento, Solano, San Joaquin, Contra Costa, Stanislaus, Tuolumne, Mariposa, Merced, Madera, Fresno, Kings, Tulare, Kern, and San Luis Obispo. Therefore, all listed species associated with up to a total of 1150 acres of habitat may be affected (23 counties times 50 acres per county).

Indirect effects

Indirect effects are caused by or result from the proposed action, are later in time, and are reasonably certain to occur. Individuals and their cysts may be injured or killed by several indirect effects:

Changes in hydrology: In addition to the direct impacts associated with filling, development can have impacts on the hydrology of remaining habitat (e.g., pools/swales) and surrounding areas. Projects involving storm water drains, deep ripping, or the coverage of land surfaces with concrete, asphalt, or irrigated recreation parks, etc., can affect the amount and quality of water available to the perched water tables characteristic of vernal pool areas. Changes to the perched water table can lead to alterations in the rate, extent, and duration of inundation (water regime) of remaining habitat. The biota of vernal pools and swales can change when the hydrologic regime is altered (Bauder 1986, 1987). Survival of aquatic organisms like fairy shrimp is directly linked

to the water regime of their habitat (Zedler 1987). Therefore, development near vernal pool areas may, at times, result in the failure of local sub-populations of vernal pool organisms, including fairy shrimp and tadpole shrimp.

Roads: Grading for roads may affect the water regime of vernal pool habitat, particularly when grading involves cutting into the substrata in or near habitat areas. Exposure of sub-surface layers of soil at road cuts may hasten the loss of water from adjacent habitat by mass flow through networks of cracks, lenses of coarser material, animal burrows, old root channels, or other macroscopic channels. Any decrease in the duration of inundation of habitat can affect the reproductive success of species present, including the listed vernal pool crustacea. Erosion associated with road building can contaminate vernal habitat through the transport and deposition of sediments into these areas. In addition, roads or other changes in drainage patterns could result in an increase in surface runoff and conversion of vernal pool habitat.

Roads in or near the watersheds of habitat areas can lead to additional impacts through the introduction of chemically laden runoff (i.e., petroleum products) from the road surfaces. Chemical contamination of habitat can kill listed species by poisoning. Roads in close proximity to habitat areas may encourage additional impacts through other human activities.

Human intrusion: Development frequently results in human intrusion into surrounding areas. Human intrusion is a mechanism by which trash or hazardous waste can be introduced into remaining habitat areas (Bauder 1986, 1987). Disposal of waste materials can eliminate habitat, disrupt pool hydrology, or release substances into pools that are toxic or that adversely affect water chemistry. In addition, off-road vehicle use and other recreational activities associated with humans can lead to wheel ruts, soil compaction, increased siltation, destruction of native vegetation, and an alteration of pool hydrology.

Pesticides/Herbicides: Development often results in the introduction of pesticides or herbicides into the environment. These chemical compounds are thought to have adverse effects on all of the listed vernal pool crustacea and/or their cysts. Individuals may be killed directly or suffer reduced fitness through physiological stress or a reduction in their food base due to the presence of these chemicals.

Introduced predators: Development may produce conditions that are favorable for exotic predators such as bullfrogs, and mosquito fish. The stomachs of bullfrogs captured in vernal pools near Chico, California were found to contain large numbers of vernal pool tadpole shrimp (Hayes, pers. com., 1993 in 59 **FR** 48136). Mosquito fish can be equally devastating as predators when introduced into vernal pool habitat. Thus, listed species and their cysts may be adversely affected by the introduction of exotic predators.

Cumulative Effects

Cumulative effects are those impacts of future State, local, and private actions affecting endangered and threatened species that are reasonably certain to occur in the action areas. Future

Federal actions will be subject to the consultation requirements established in section 7 of the Act and, therefore, are not considered cumulative to the proposed project.

Because the Conservancy fairy shrimp, longhorn fairy shrimp, vernal pool tadpole shrimp, and vernal pool fairy shrimp are endemic to vernal pools in the Central Valley, coast ranges, and a limited number of sites in the transverse range and Santa Rosa plateau of California, the Service anticipates that a wide range of activities will be determined to affect these species. Such activities include, but are not limited to, urban, water, flood control, highway, and utility projects, chemical contaminants, as well as conversion of vernal pools to agricultural use. Many of these activities will be reviewed under section 7 of the Act as a result of the Federal nexus provided by section 404 of the Federal Water Pollution Control Act, as amended (Clean Water Act). The Service is currently unaware of any State, local, or private actions which, when considered in conjunction with the known environmental baseline for these species, would be likely to preclude the survival and recovery of the Conservancy fairy shrimp, longhorn fairy shrimp, vernal pool tadpole shrimp, and vernal pool fairy shrimp.

Conclusion

After reviewing the current status of the endangered longhorn fairy shrimp, Conservancy fairy shrimp, vernal pool tadpole shrimp, and the threatened vernal pool fairy shrimp; the environmental baseline for the area within the jurisdiction of the SFO; the effects of the proposed projects; and the cumulative effects; it is the Service's biological opinion that the proposed projects, as described in this consultation document, are not likely to jeopardize the continued existence of these species. Critical habitat has not been proposed for these species; therefore, none will be affected.

INCIDENTAL TAKE STATEMENT

Section 9 of the Act prohibits take (harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or attempt to engage in any such conduct) of listed species of fish or wildlife without a special exemption. Harass is defined as an intentional or negligent act that creates the likelihood of injury to a listed species by annoying it to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding, or sheltering. Harm is defined to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing behavioral patterns such as breeding, feeding, or sheltering. Incidental take is any take of listed animal species which result from, but is not the purpose of, carrying out an otherwise lawful activity conducted by the Federal agency or the applicant. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to, and not intended as part of, the agency action is not considered a prohibited taking provided that such taking is in compliance with this incidental take statement.

The measures described below are nondiscretionary, and must be implemented by the Corps so that they become binding conditions of any grant or permit issued to the applicant, as

appropriate, in order for the exemption in section 7(o)(2) to apply. The Corps has a continuing duty to regulate the activity covered by this incidental take statement. If the Corps (1) fails to require the applicant to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit or grant document, and/or (2) fails to retain oversight to ensure compliance with these terms and conditions, the protective coverage of section 7(o)(2) may lapse.

Amount or Extent of Take

The Service anticipates the following forms of incidental take:

1. An unknown number of adult and juvenile Conservancy fairy shrimp, longhorn fairy shrimp, vernal pool tadpole shrimp, and vernal pool fairy shrimp per pool affected will be killed as a result of proposed projects that will destroy or modify habitat.
2. An unknown number of cysts of the Conservancy fairy shrimp, longhorn fairy shrimp, vernal pool tadpole shrimp, and vernal pool fairy shrimp will be lost per pool affected due to changes in hydrology of habitat that will occur as a result of proposed development projects.

The proposed action may result in incidental take of all listed vernal pool crustaceans associated with up to 50 acres of habitat in each of the following counties: Shasta, Tehama, Plumas, Butte, Glenn, Colusa, Sutter, Placer, Yolo, Sacramento, Solano, San Joaquin, Contra Costa, Stanislaus, Tuolumne, Mariposa, Merced, Madera, Fresno, Kings, Tulare, Kern, and San Luis Obispo.

Effect of the Take

In the accompanying biological opinion, the Service has determined that this level of anticipated take is not likely to result in extinction or a reduction of opportunity for recovery of Conservancy fairy shrimp, longhorn fairy shrimp, vernal pool tadpole shrimp, or vernal pool fairy shrimp.

Reasonable and Prudent Measures

The following reasonable and prudent measures are necessary and appropriate to minimize incidental take of Conservancy fairy shrimp, longhorn fairy shrimp, vernal pool tadpole shrimp, and vernal pool fairy shrimp:

1. The impact of habitat loss to vernal pool species shall be minimized;
2. Loss of listed vernal pool crustacean habitat shall be confined to the proposed project site, and habitat and associated upland remaining on site shall be protected from adverse impacts; and,

3. The baseline condition for vernal pool species shall be adequately tracked to ensure that no more than 50 acres of habitat per county are authorized for fill under this biological opinion.

Terms and Conditions

In order to be exempt from the prohibitions of section 9 of the Act, the following terms and conditions, which implement the reasonable and prudent measures described above, must be complied with.

1. To implement reasonable and prudent measure (1), mitigation measures A through C as described on pages three and four of this biological opinion shall be accomplished. These measures are hereby incorporated into these terms and conditions as requirements of the proposed projects.
2. To implement reasonable and prudent measure (2), mitigation measures D through G as described on page four of this biological opinion shall be accomplished. These measures are hereby incorporated into these terms and conditions as requirements of the proposed projects.
3. To implement reasonable and prudent measure (3), mitigation measures H and I as described on page five of this biological opinion shall be accomplished. These measures are hereby incorporated into these terms and conditions as requirements of the proposed projects.

Reporting Requirements

Any unauthorized deviation from the Description of the Proposed Action will be reported, within one working day of discovery, to the Assistant Field Supervisor at (916) 414-6600. Written notification must be made within three calendar days and include the date, time, and precise location of the event indicated on a U.S. Geological Survey 7.5 minute topographic map, and any other pertinent information. Additionally, color photographs should be taken of the specific site and provided with the notification.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the Act directs Federal agencies to utilize their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species. The term "conservation recommendations" has been defined as suggestions from the Service regarding discretionary measures to minimize or avoid adverse effects of a proposed action on listed species or critical habitat or regarding the development of information.

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

1. The Corps should work with the Service to establish functioning preserve and creation banking systems in each county to further the conservation of listed crustacean species. Such banking systems could incorporate other Corps-required mitigation (i.e., seasonal wetlands, riparian habitats, etc.);
2. As recovery plans for listed crustacean species are developed, the Corps should assist the Service in their implementation;
3. The Corps should work with the Service to ensure that its wetland delineation techniques fully assess the impacts of proposed projects on listed crustacean species; and,
4. The uppermost layer of soil in seasonally ponded habitat may contain cysts of listed crustaceans as well as seeds of vernal pool plants. Therefore, before these wetlands are filled, the top layer of soil should be made available to any vernal pool creation bank that requests it, with Service approval, for inoculating newly created pools. Soil stockpiled for this purpose or for on-site creation should be shielded from rain with a water-proof cover to ensure that it remains completely dry.

REINITIATION - CLOSING STATEMENT

This concludes formal consultation on the project described in this biological opinion. As provided for in 50 CFR §402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been maintained (or is authorized by law), and if (1) the amount or extent of incidental take is exceeded, (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion, (3) the agency action is subsequently modified in a manner that causes an effect to listed species or critical habitat that was not considered in this opinion, or (4) a new species is listed or critical habitat is designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take should cease pending reinitiation.

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Appendix H

Biological Resources Technical Memo,
prepared by CH2MHill,
dated February 25, 2002.

Final Report

**Natomas Basin Habitat
Conservation Plan
Impacts to Proposed
Covered Species**

Prepared for
**City of Sacramento and
Sutter County**

July 1, 2002

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Introduction

The proposed Natomas Basin Habitat Conservation Plan (HCP) has been developed to provide and implement a conservation strategy to minimize impacts of planned land development and water facility operations and maintenance (O&M) in the Natomas Basin. The HCP conservation measures apply to 22 special-status species ("covered species") in the Natomas Basin. The effects to the covered species from these planned activities and from ongoing and future water agencies' O&M activities are addressed in this report.

On the basis of the HCP that was previously prepared in 1997, the City of Sacramento (City) received incidental take authorization from the U.S. Fish and Wildlife Service (USFWS) and the California Department of Fish and Game (CDFG) in December 1997. Environmental review under the National Environmental Policy Act and the California Environmental Quality Act was conducted by the USFWS and the City, respectively. In August 2000, parts of a legal challenge to the validity of the USFWS's action to issue an incidental take permit to the City were upheld by the U.S. District Court for the Eastern District of California (Court), which issued a Memorandum of Opinion and Order (Opinion) on the plaintiffs' claims.¹ In addition, in the interim since the 1997 HCP, Sutter County, Reclamation District No. 1000 (RD 1000), and the Natomas Central Mutual Water Company (Natomas Mutual) have joined the HCP process as applicants.²

The City, Sutter County, RD 1000, and Natomas Mutual are preparing an HCP for the Natomas Basin that includes new and updated information and addresses the issues raised in the Court's Opinion. In addition, the HCP being prepared is incorporating measures applicable to the parties that joined process subsequent to 1997. This technical memorandum (TM) presents the expected impacts to the covered species in the Natomas Basin resulting from implementation of the HCP. The analysis in this TM is based on the proposed HCP dated January 14, 2002, with the exception that four species (American peregrine falcon, greater sandhill crane, Conservancy fairy shrimp, and longhorn fairy shrimp) were subsequently removed from the list of covered species proposed in the January 14, 2002 draft.

The TM is presented in the following sections:

- Section 1. Introduction
- Section 2. Proposed Natomas Basin Habitat Conservation Plan
- Section 3. Methods
- Section 4. Plan Area Acreage
- Section 5. Species Assessment
- Section 6. References

¹ *National Wildlife Federation, et al. v. Secretary of the Interior Bruce Babbitt*, August 15, 2000.

² Sutter County, RD 1000, and Natomas Mutual joined the HCP process subsequent to the Court Opinion on the prior HCP. The HCP addresses Sutter County's land development plans for the southern part of the county. It also includes Natomas Mutual's and RD 1000's O&M activities for the water facilities under their separate management.

Proposed Natomas Basin HCP

This section presents an overview of the purpose of the HCP and summarizes its key measures to provide a context for the analysis conducted in this report. The conservation measures assessed in this report are contained in the January 14, 2002 HCP.

2.1 Purpose of the Proposed Natomas Basin HCP

The purpose of the HCP, as described in Section 1.A. of the HCP, is to promote biological conservation in conjunction with economic and urban development within the Natomas Basin (Figure 2-1). The HCP would establish a multi-species conservation program to mitigate the expected loss of habitat values and incidental take of covered species that could result from urban development, O&M of canal and drain systems, and certain agricultural activities associated with the management of the habitat reserves established under the HCP. The goal of the HCP is to preserve, restore, and enhance habitat values and maintain viable populations of species found in Natomas Basin while allowing covered activities to proceed. The covered species are presented in Table 2-1.

2.2 Summary of Provisions

Implementation of the HCP would result in the establishment and management of permanent habitat reserves. The HCP also requires minimization measures during urban development activities and for the O&M activities of RD 1000 and Natomas Mutual for the canals and drains under their administration. Key provisions of the HCP are summarized in the following subsections.

2.2.1 Habitat Reserves

The HCP would establish a comprehensive program for the preservation and protection of habitat for threatened and endangered species potentially present in the Natomas Basin. The acquisition of lands or conservation easements for the purpose of creating and managing permanent habitat reserves would be the primary mechanism for mitigating impacts to listed species. The HCP describes a method of funding the land acquisition and the general restoration and management goals for the acquired lands. It identifies the Natomas Basin Conservancy (Conservancy) as the "plan operator" to implement the plan.

The primary component of the HCP's conservation strategy for funding habitat reserve acquisition would be the use of mitigation fees to set aside 0.5 acres of habitat land for each gross acre of development that occurs in the Natomas Basin. Land development would result in 17,500 acres in the Natomas Basin being converted to urban and associated uses, in addition to the existing urban uses as of December 1997. Thus, under the 0.5-to-1 mitigation ratio, approximately 8,750 acres of land would be acquired by the Conservancy (or conservation easement purchased) as habitat reserves. Habitat reserves would be managed by the Conservancy and would consist of managed marsh habitats, upland habitats, rice

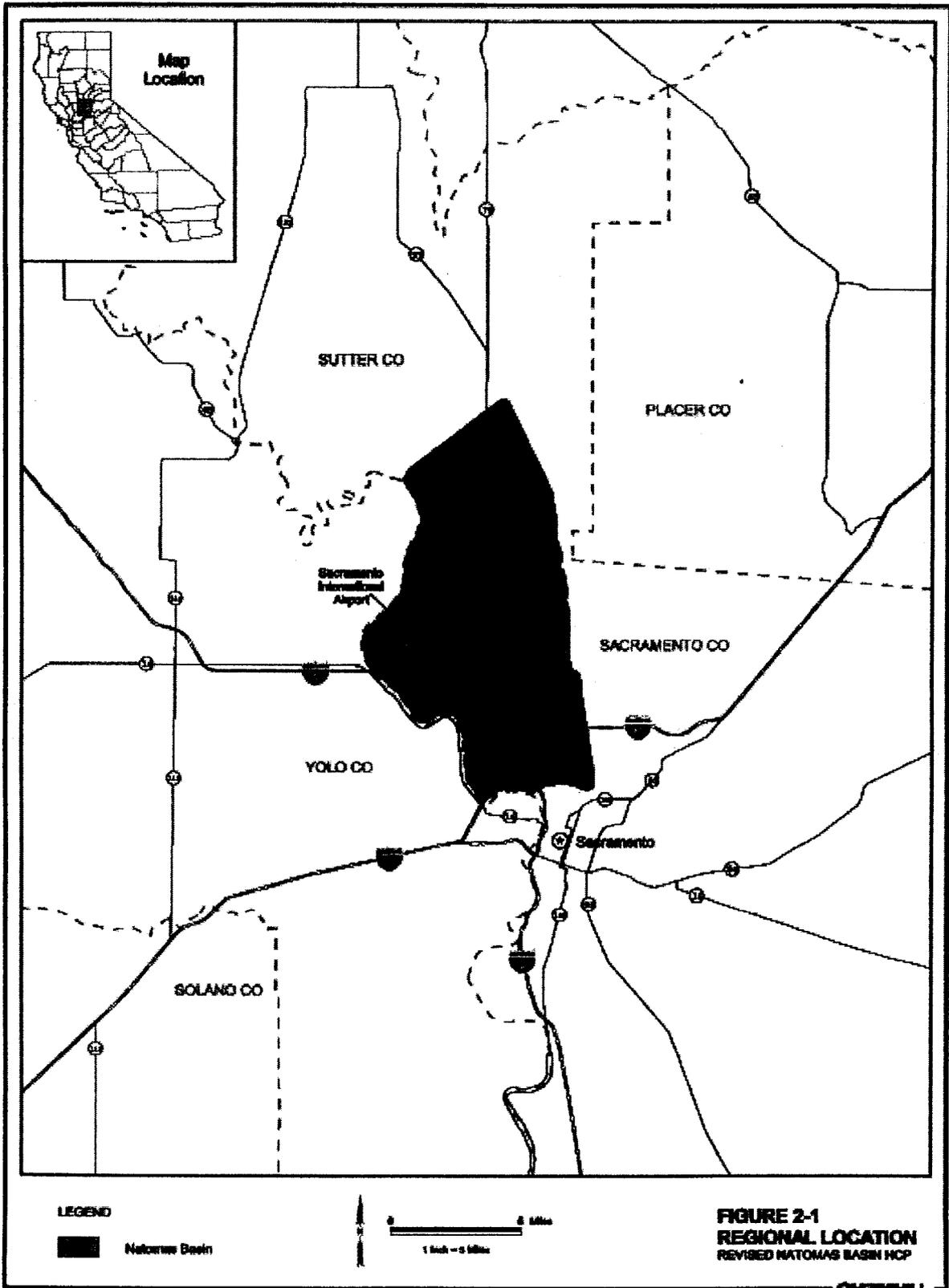


TABLE 2-1
Proposed HCP Covered Species

Habitat and Species	Federal Status	State Status
Wetland Associated Species		
Aleutian Canada goose <i>Branta canadensis leucopareia</i>	Species of Concern (recently delisted)	NA
Swainson's hawk <i>Buteo swainsoni</i>	NA	Threatened
giant garter snake <i>Thamnophis gigas</i>	Threatened	Threatened
white-faced ibis <i>Plegadis chihi</i>	Species of Concern	Species of Special Concern
bank swallow <i>Riparia riparia</i>	NA	Threatened
tricolored blackbird <i>Agelaius tricolor</i>	Species of Concern	Species of Special Concern
northwestern pond turtle <i>Clemmys marmorata marmorata</i>	Species of Concern	Species of Special Concern
Valley elderberry longhorn beetle <i>Desmocerus californicus dimorphus</i>	Threatened	NA
delta tule pea <i>Lathyrus jepsonii ssp. jepsonii</i>	Species of Concern	NA
Sanford's arrowhead <i>Sagittaria sanfordii</i>	Species of Concern	NA
Upland Associated Species		
Swainson's hawk <i>Buteo swainsoni</i>	NA	Threatened
tricolored blackbird <i>Agelaius tricolor</i>	Species of Concern	Species of Special Concern
loggerhead shrike <i>Lanius ludovicianus</i>	Species of Concern	Species of Special Concern
burrowing owl <i>Athene cunicularia</i>	Species of Concern	Species of Special Concern
Vernal Pool Associated Species		
vernal pool fairy shrimp <i>Branchinecta lynchi</i>	Threatened	NA
vernal pool tadpole shrimp <i>Lepidurus packardii</i>	Endangered	NA
midvalley fairy shrimp <i>Branchinecta mesovallensis</i>	NA	NA
California tiger salamander <i>Ambystoma californiense</i>	Candidate	Candidate Protected Amphibian
western spadefoot toad <i>Scaphiopus hammondi</i>	Species of Concern	Protected Amphibian
Colusa grass <i>Neostapfia colusana</i>	Threatened	NA

TABLE 2-1
Proposed HCP Covered Species

Habitat and Species	Federal Status	State Status
Boggs Lake hedge-hyssop <i>Gratiola heterosepala</i>	NA	Endangered
Sacramento Orcutt grass <i>Orcuttia viscida</i>	Endangered	Endangered
slender Orcutt grass <i>Orcuttia tenuis</i>	Threatened	Endangered
legenere <i>Legenere limosa</i>	Species of Concern	NA

Source: Natomas Basin Habitat Conservation Plan, January 2002.

NA The status is not applicable to this species

fields (which would typically be leased to rice farmers), and associated buffers and infrastructure. The HCP does not specify any particular land area for acquisition as habitat reserves because many factors, including the quality and availability of parcels and the willingness of owners to sell, could affect the land areas ultimately purchased. Rather, the HCP relies on a detailed, science-based acquisition criteria, and land purchases are subject to review by a Technical Advisory Committee that includes representatives from the USFWS and CDFG. Additional information about the proposed system of habitat reserves is in Section IV.C of the HCP.

2.2.2 O&M Activities Conducted by RD 1000 and Natomas Mutual

RD 1000's and Natomas Mutual's primary O&M efforts focus on keeping the canal systems under their administration functioning in a manner that maximizes the timely movement of irrigation water for agricultural purposes and ensures drainage of agricultural water and storm flows from lands within the Natomas Basin. RD 1000 and Natomas Mutual carry out these activities to provide water and drainage for agricultural production, and to minimize potential damage to property from flooding. Specific measures to be implemented by RD 1000 and Natomas Mutual are described in Section V.B of the HCP, and include the following measures:

- Restrictions on the extent of canal and ditch maintenance operations that could occur in any calendar year
- Restrictions on the timing of canal and ditch maintenance operations
- Restrictions on the de-watering and filling of canals and drains
- Detailed measures for control of weedy vegetation (e.g., restrictions on mowing, aquatic and other herbicide use, burning), traffic, and rodents
- A program for educating staff regarding awareness of potential for O&M activities to impact giant garter snakes
- Provisions to allow emergency activities

2.2.3 Take Avoidance

In addition to the summarized measures that are intended to address incidental take of covered species, the HCP also includes measures to minimize the potential for incidental take to occur during covered activities (i.e., land development, O&M of canals and drains). These minimization measures include canal/drain dewatering and seasonal grading restrictions for giant garter snakes, and nest site protection and replacement measures for Swainson's hawks. These and other minimization measures are described throughout Section V of the HCP.

SECTION 3.0

Methods

The objective of the analysis in this report is to identify impacts to covered species in the Natomas Basin as a result of expected land use changes (i.e., planned land development of 17,500 acres; a habitat reserve system of 8,750 acres). This section describes the methods for the development of the land use/habitat categories used to demonstrate the changes in Natomas Basin acreage in Section 4 and the species assessment in Section 5 of this report. The methods presented below were discussed and approved by the Environmental Impact Report/Environmental Impact Statement (EIR/EIS) team at various meetings conducted in support of the preparation of the HCP and the EIR/EIS.³

To assist in the analysis of expected habitat changes, standard categories of existing land uses and a Geographic Information System (GIS) database were developed to provide a framework for predicting future land areas assigned to each of these categories. The year 1997 is the initial year in which land use characteristics are considered, because the previous take permits were approved then. Additional information available since 1997 and field data gathered in 2001 were used to supplement and update the 1997 data. In this report, this updated scenario is referred to as the baseline. The primary steps in developing the land use database are presented below.

- Digital aerial photos were obtained from the U.S. Geological Survey and assembled into a mosaic containing the entire Natomas Basin. The boundary of the Basin was set at the toe of the surrounding levees, providing a total area of 53,537 acres.
- A land use classification system was developed, focusing on the habitat information necessary for this specific analysis. Eighteen land use categories were developed, which are described in Table 3-1.
- Land use data from the Department of Water Resources (DWR) were added to the GIS database, and the DWR categories were translated to match the eighteen land use categories developed for the project.
- The resulting land use map was modified based on field data collected by May & Associates. This resulted in a greater level of detail (a one-acre minimum "polygon") and a more accurate map. Jurisdictional boundaries were added to the GIS database.

An additional component of the GIS database is the system of canals and drains owned and maintained by RD 1000 and Natomas Mutual. Existing digital information on the canals and drains was obtained from RD 1000 and Natomas Mutual and added to the database as linear features. Based on the field data collected by May & Associates, the canals and drains were divided into four categories: Class I (the canal land use category including the primary

³ The HCP EIR/EIS team consists of representatives from the City, Sutter County, USFWS, CDFG, RD 1000, and Natomas Mutual. The meetings at which the methodology was discussed and agreed upon occurred in Spring 2001.

TABLE 3-1
Description of Land Use/Habitat Categories

Category	Description
Airport	Lands within the ownership boundary for the Sacramento International Airport, including all land use types (e.g., facilities, runways, open lands and farmlands adjacent to runways) within boundary. Does not include airport buffer lands (e.g., south of I-5). Also includes the former Natomas Air Park and several small rural airstrips (one in Sacramento County and two in Sutter County).
Alfalfa	Based on a subset of the DWR "Pasture" land use category that includes alfalfa production, as estimated for the HCP baseline. Includes known alfalfa fields along Garden Highway in Sutter County.
Canals	The largest (Class I) canals and drains (including adjacent maintenance roads) in the Natomas Basin, primarily the ones already digitized for the DWR land use maps. Includes the East Drain, West Drain, Main Drain, North Drain, and the Central Main Canal. Does not include smaller canals and drains, which are recorded in the project database as linear features.
Grassland	Based on DWR "Native Vegetation" land use category with additional information provided by May & Associates field data and aerial photo interpretation, as estimated for the HCP baseline. Includes known uncultivated grasslands, primarily along the eastern border of the Natomas Basin.
Highways	Includes I-5, I-80, S.R. 99/70, and interchanges, including all areas within medians.
Idle	Based on DWR "Idle" land use category - agricultural lands temporarily out of production.
Non-Rice Crops	Based on the DWR land use categories of "Grain and Hay Crops," "Field Crops," and "Tilled Lands." In the Natomas Basin, this category includes primarily wheat, corn, safflower, and tomatoes.
Oak Groves	Includes several isolated pockets of mature oak trees east of Garden Highway.
Orchard	Based on the DWR land use categories of "Deciduous Fruits/Nuts" and "Citrus and Subtropical." In the Natomas Basin, this includes primarily pear, peach, and walnut orchards adjacent to Garden Highway.
Other	Miscellaneous land uses not captured by other land use categories. Includes Teal Bend Golf Course, the wastewater plant at Sacramento International Airport, and several utility substations.
Pasture	Based on DWR "Pasture" land use category, including primarily irrigated pasture in the Natomas Basin.
Ponds and Seasonally Wet Areas	Wetland/marsh areas including Pritchard's Lake and several isolated locations throughout the Natomas Basin. Based on DWR's "Water Surface" land use category and some "Riparian Vegetation" categories, with additional information provided by May & Associates data and aerial photo interpretation.
Rice	Based on DWR's "Rice" land use category.
Riparian	Based on DWR's primary "Riparian" category, with additional information provided by May & Associates data. Includes cottonwood/willow areas along primary canals and drains, including the Fisherman's Lake area.
Ruderal	Includes former agricultural lands that are no longer in production, primarily as a result of their proximity to urbanized areas (e.g., surrounding Arco Arena). Includes DWR's "Barren" and "Vacant" land use categories. Ruderal lands typically consist of non-native grasses, and most are occasionally tilled for fire control.
Rural Residential	Includes farmhouses and farm equipment yards. Includes DWR's "Semi-Agricultural" land use category, with additional information provided by aerial photo interpretation.
Tree Groves	Includes non-riparian stands of trees other than mature oaks. Based on DWR's "Native Vegetation" land use category, with additional information by May & Associates data and aerial photo interpretation.
Urban	Urbanized areas. Primarily in the City of Sacramento, but also including unincorporated areas along El Centro Road in Sacramento County and Pacific Avenue in Sutter County.

drainage system), Class II (large), Class III (medium), and Class IV (small). Following the completion of the baseline scenario described above, the last step in the development of the database was to create a future land use scenario corresponding to buildout conditions in the Natomas Basin. This buildout conditions include the planned land development activities of the City and Sutter County, and the development of the Metro Air Park project in unincorporated Sacramento County. Although Sacramento County is not an applicant, the HCP includes Metro Air Park in the 17,500 acres of planned development to be included in the HCP. A separate HCP application has been filed for the 1,983-acre Metro Air Park property (Metro Air Park Property Owners' Association, 2001).

SECTION 4.0

Plan Area Acreage

On the basis of the methodology described in Section 3.0, the acreage assignments for the land use classes and other features, by jurisdiction, are presented in this section. Table 4-1 shows the acreage of land use classes for the areas that would be covered by the conservation measures of the proposed HCP. Tables 4-2 and 4-3 show the miles and acres, respectively, of canals and drains, by jurisdiction. Table 4-4 shows the total HCP baseline acreage by land use class and jurisdiction, and the expected future acreage in the basin as a result of urban development. Tables 4-5 and 4-6 show the miles and acres, respectively, of canals and drains for the HCP baseline, changes in the miles and acres of canals and drains in each jurisdiction, and the expected future condition for the basin as a result of urban development.

TABLE 4-1
Land Uses in the Natomas Basin by Jurisdiction (acres)

Land Use Class	City of Sacramento ^a	Metro Air Park	Other Sacramento County	Sutter County	Total
Airport	18	0	1,512	21	1,551
Alfalfa	0	0	137	234	371
Canals ^b	129	0	308	66	503
Grassland	454	0	293	138	886
Highways	450	0	414	571	1,435
Idle	839	50	480	94	1,464
Non-rice Crops	4,905	325	8,591	2,866	16,686
Oak groves	15	2	70	11	98
Orchard	13	0	169	0	182
Other	148	0	305	15	468
Pasture	35	22	261	355	674
Ponds and seasonally wet areas	7	4	75	10	96
Rice	987	1,541	8,427	11,737	22,693
Riparian	24	0	93	6	124
Ruderal	1,429	6	261	274	1,970
Rural residential	49	10	170	148	377
Tree groves	36	23	39	8	106
Urban	3,298	0	229	327	3,854
Total	12,836	1,983	21,836	16,881	53,537

TABLE 4-1
Land Uses in the Natomas Basin by Jurisdiction (acres)

Land Use Class	City of Sacramento ^a	Metro Air Park	Other Sacramento County	Sutter County	Total
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^a City lands include the unincorporated panhandle area proposed for annexation.

^b The Canal land use category includes only Class I canals and drains, the largest canals and drains that are digitized as area features in the GIS database. Class II, III, and IV canals and drains are not included in this table because they are linear features in the GIS database.

TABLE 4-2
Canals and Drains in the Natomas Basin by Jurisdiction (miles)

Canal Type	City of Sacramento	Metro Air Park	Other Sacramento County	Sutter County	Total
Class I	12.9	0	15.0	7.1	36.0
Class II	4.0	4.0	18.0	24.5	50.5
Class III	15.1	3.5	50.5	28.5	97.6
Class IV	5.1	4.1	31.4	22.3	62.9
Total	37.1	11.6	114.9	82.3	247.0

TABLE 4-3
Canals and Drains in the Natomas Basin by Jurisdiction (acres)

Canal Type	City of Sacramento	Metro Air Park	Other Sacramento County	Sutter County	Total
Class I	129	0	308	66	503
Class II ^a	32	32	144	196	404
Class III ^a	90	21	301	170	582
Class IV ^a	23	19	145	103	289
Total	274	72	898	535	1,778

^a Class II, III, and IV canals and drains are linear features in the GIS database. Conversion to area features required using a standard width for each canal type, which was determined to be 65.9, 49.2, and 38.0 feet for Class II, III, and IV canals, respectively, based on information from Natomas Mutual. These standard widths include adjacent upland areas (e.g., maintenance roads) in addition to channel width.

TABLE 4-4
Land Use Acreage in the Natomas Basin Under the HCP Baseline and Future Conditions (acres)

Habitat Class	HCP Baseline	Change from Development – City of Sacramento	Change from Development – Metro Air Park	Change from Development – Sutter County	Total Change from Development	Future Condition ^a
Airport	1,551	(18)	0	(21)	(39)	1,513
Alfalfa	371	0	0	0	0	371
Canals	503	0	0	0	0	503
Grassland	886	(427)	0	(134)	(560)	325
Highways	1,435	0	0	0	0	1,435
Idle	1,464	(675)	(50)	(8)	(733)	731
Non-rice crops	16,686	(4,663)	(325)	(1,529)	(6,517)	10,169
Oak groves	98	(6)	(2)	0	(8)	89
Orchard	182	(13)	0	0	(13)	169
Other	468	(31)	0	0	(31)	437
Pasture	674	(23)	(22)	(101)	(147)	527
Ponds and seasonally wet areas	96	(7)	(4)	(10)	(21)	75
Rice	22,693	(970)	(1,541)	(5,577)	(8,087)	14,606
Riparian	124	(24)	0	0	(24)	100
Ruderal	1,970	(1,137)	(6)	(88)	(1,231)	739
Rural residential	377	(46)	(10)	0	(56)	321
Tree groves	106	(10)	(23)	0	(33)	73
Urban	3,854	8,050	1,983	7,467	17,500	21,354
Total	53,537	0	0	0	0	53,537

^a Does not include the effects associated with the creation of habitat reserves.

(#) Decrease in acre

Source: Habitat and Land Use Assessment Database (CH2M HILL, 2002).

TABLE 4-5
Canals and Drains in the Natomas Basin by Jurisdiction (miles)

Canal Type	HCP Baseline	Change from Development - City of Sacramento	Change from Development - Metro Air Park	Change from Development - Sutter County	Total Change from Development	Future Condition
Class I	35.9	0	0	0	0	35.9
Class II	50.5	(3.6)	(4.0)	(13.9)	(21.5)	29.0
Class III	97.6	(12.1)	(3.5)	(9.8)	(25.5)	72.1
Class IV	62.8	(3.6)	(4.1)	(9.9)	(17.5)	45.3
Total	246.8	(19.3)	(11.6)	(33.6)	(64.5)	182.3

(#) Decrease in age

Source: Habitat and Land Use Assessment Database (CH2M HILL, 2002).

TABLE 4-6
Canals and Drains in the Natomas Basin by Jurisdiction (acres)^a

Canal Type	HCP Baseline	Change from Development - City of Sacramento	Change from Development - Metro Air Park	Change from Development - Sutter County	Total Change from Development	Future Condition
Class I	503	0	0	0	0	494
Class II	404	(29)	(32)	(111)	(172)	232
Class III	582	(72)	(21)	(59)	(152)	430
Class IV	289	(16)	(19)	(45)	(80)	209
Total	1,778	(117)	(72)	(215)	(404)	1,365

^a Class II, III, and IV canals and drains are linear features in the GIS database. Conversion to area features required using a standard width for each canal type, which was determined to be 65.9, 49.2, and 38.0 feet for Class II, III, and IV canals, respectively, based on information from Natomas Mutual. These standard widths include adjacent upland areas (e.g., maintenance roads) in addition to channel width.

(#) Decrease in age

Source: Habitat and Land Use Assessment Database (CH2M HILL, 2002).

Species Assessment

The impacts of implementing the HCP on species proposed for coverage under the HCP are described in this section. The assessment includes a species description that summarizes the habitat needs of each of the species considered in the analysis, and an impact evaluation that describes the expected response of the species to changed habitat conditions with implementation of the HCP. Three categories of potential impacts have been identified: (1) effects of overall changes in habitat within the Natomas Basin; (2) direct effects during construction activities; and (3) ongoing effects of O&M activities of canal and drainage systems conducted by Natomas Mutual and RD 1000 as well as effects of O&M activities conducted by the Conservancy in managing the habitat reserves.

- **Effects from Changes in Habitat.** This component of the analysis discusses the viability of each species in the Natomas Basin given expected future habitat conditions. This portion of the analysis, therefore, addresses the effectiveness of the HCP measures in mitigating the loss of habitat resulting from planned urban development. Habitat changes and the effectiveness of the HCP measures are evaluated for land use jurisdictions individually and collectively.
- **Construction Effects.** This component of the analysis discusses potential impacts to each species during construction for urban development and for creation of habitat on the Conservancy reserves. The analysis, therefore, addresses the effectiveness of the HCP measures in avoiding and minimizing take (mortality) associated with construction.
- **O&M Effects.** This component of the analysis discusses potential impacts to each species during O&M activities by RD 1000 and Natomas Mutual required to maintain the canal and drains, and by the Conservancy during O&M (including farming operations) on the habitat reserves. This analysis, therefore, addresses the effectiveness of the HCP measures in avoiding and minimizing take (mortality) associated with O&M.

Based on the evaluations of the effect of habitat changes, construction activities, and O&M activities, overall effects of the HCP on the species persistence in the Natomas Basin are assessed assuming that all of the four potential permittees (City, Sutter County, Natomas Mutual, and RD 1000) participate in the HCP.

5.1 Giant Garter Snake (*Thamnophis gigas*)

5.1.1 Species Description

The giant garter snake is listed as Threatened under both the Federal Endangered Species Act and the California Endangered Species Act. The giant garter snake is an endemic species of wetlands in the Central Valley of California. Historically, giant garter snakes were found from the vicinity of Butte County southward to Bakersfield in Kern County. Today, populations of giant garter snake are found in the Sacramento Valley and in isolated pockets of the San Joaquin Valley.

The giant garter snake inhabits marshes, sloughs, ponds, small lakes, low gradient streams, irrigation and drainage canals, riceland, and adjacent uplands in the Central Valley. Essential habitat components consist of: (1) adequate water during the snake's active season (early spring through mid-fall) to provide adequate permanent water to maintain dense populations of food organisms; (2) emergent, herbaceous wetland vegetation such as cattails (*Typha* spp.) and bulrushes (*Scirpus* spp.) for escape cover and foraging habitat during the active season; (3) upland habitat with grassy banks and openings in waterside vegetation for basking; and (4) higher elevation upland habitats for cover and refuge from flood waters during the snake's inactive season in winter (Hansen, 1988; 1993; Hansen and Brode, 1980; Brode and Hansen, 1992). The giant garter snake feeds on aquatic prey, including small fish and frogs, carp, mosquitofish, bullfrogs, and treefrogs.

In the Natomas Basin, giant garter snakes begin entering their winter retreats in rodent burrows excavated in channel and canal banks, rubble piles, and other upland sites by the end of October. After emergence from winter retreats (late March or early April), giant garter snakes use canals with water that persists through the summer months. These canals could contain adequate emergent aquatic vegetation and steep, vegetated banks that provide cover, and a food supply. Rice fields are also used by giant garter snakes after rice growth is sufficiently high to provide cover. Following pre-harvest rice field draining, giant garter snakes move out of rice fields and re-enter canals, where they feed on the high concentration of prey species that washout from the rice fields into the canals. Following the heavy feeding, they enter winter retreats.

Giant garter snakes are known to use rice fields and associated features of the Natomas Basin's rice-growing landscape for some of their habitat needs (Brode and Hansen, 1992), including the canals, ditches, and drains of the Basin's water conveyance systems, the higher ground of levees, and sloughs and marshes. Giant garter snakes use constructed waterways, such as those of the Natomas Basin's water conveyance system. The irrigation canals and drainage ditches, together with their associated levees and adjacent embankments, are important components of giant garter snake habitat in the Basin. Irrigation canals can provide all the habitat components described above and create dispersal corridors allowing garter snakes to move from one area to another in search of mates, new territories, and summer habitat. In a radio-telemetry study of giant garter snakes in the Elverta area of the Natomas Basin, from 40 to 90 percent of the occurrences of snakes were in irrigation canals and ditches (Wylie and Cassaza, 2000). Snakes used canals and ditches to a greater degree in the spring but reduced use in the summer when rice fields were flooded. Hansen and Brode (1992) also provide data illustrating use of water conveyance structures by giant garter snakes. Giant garter snakes move around to find suitable habitat as conditions in the rice fields, marshes, and canals and ditches change, especially during the dry summer months. Thus, connectivity between canals and ditches in different areas and between these systems and other habitat types is important for genetic interchange and ability to find summer habitat.

Previous surveys and other historical information indicate a fairly widespread distribution of giant garter snakes within the Natomas Basin. Virtually all these sightings are from areas where rice is grown. Within these areas, they are strongly associated with the rice fields themselves and the associated ditch/drain components of the water conveyance system. On this basis, a surrogate for estimating the amount of giant garter snake habitat in the

Natomas Basin is the acreage of rice fields in the basin and ditch/drain habitat embedded in the rice landscape. These are estimated at approximately 23,000 acres of rice fields and 250 miles of ditches and drains in the Basin based on 1997 data. A study conducted from 1998 to 1999 recorded 277 individual giant garter snakes in the Natomas Basin (Wylie and Casazza, 2000). Giant garter snakes were found in a network of ditches and rice field habitats, including several occurrences in Fisherman's Lake and other RD 1000's canals within the Basin.

5.1.2 Environmental Effects

Effects of Changes in Habitat

Potential habitat for the giant garter snake in the Natomas Basin currently consists of rice fields, irrigation canals/ditches, ponds and seasonally wet areas, and uplands adjacent to these habitat types. Wetland habitats are used by snakes during the summer months for foraging and cover. During winter, snakes use upland areas for hibernation. Upland areas that snakes use for overwintering are always in close proximity to wetland-type habitats, typically within 100 feet but up to 820 feet (Hansen, 1988, cited in USFWS 1999a; Wylie et al., 1997).

The amount of rice fields, irrigation canals/ditches, ponds and seasonally wet areas is used to represent total habitat for giant garter snake (both marsh and upland habitat) in the Natomas Basin. For rice and ponds and seasonally wet areas, the GIS did not distinguish small-scale features such as rice checks, berms and road embankments that could provide upland habitat. Rather, these features were incorporated into the overall habitat designation so that the acreage estimates for rice and ponds and seasonally wet areas encompassed both marsh and upland areas. The acreage estimates for canals/ditches also included both the wetted portion of the canal and the adjacent embankments that could provide upland habitat for giant garter snake.

Based on the GIS, the Natomas Basin supports about 24,567 acres of potential habitat (marsh and upland combined) for giant garter snakes, consisting of rice fields, irrigation canals/ditches, and ponds and seasonally wet areas. Only a portion of this acreage would be expected to be used by giant garter snakes. Giant garter snakes appear to be an edge-associated species, concentrating their activities at wetland/upland interfaces (Wylie and Casazza, 2000). In rice fields, snakes primarily use edges along the field perimeter or along check structures (Wylie and Casazza, 2000). The future acreage of rice shown in Table 5-1, however, would not all serve as giant garter snake habitat because they associate with the edges of rice fields.

Although about 45 percent of the Natomas Basin provides potential habitat for the giant garter snake, that habitat consists almost entirely of rice fields and irrigation canals/ditches. Rice fields are intensively managed monocultures that are highly altered from the natural marsh conditions in which the giant garter snake evolved. Native marsh habitats are virtually absent from the Natomas Basin, occurring on only about 97 acres (about 0.2 percent) of the basin.

Urban development under the HCP would reduce giant garter snake habitat in the Natomas Basin by about 8,512 acres. The habitat classes (from Tables 4-3 and 4-4) that provide potential habitat for giant garter snakes and the changes in acreage from

TABLE 5-1
Change in Potential Habitat for Giant Garter Snake (acres)

Habitat Class ^a	Baseline	City of Sacramento	Metro Air Park	Sutter County	Total Change	Future Condition
Ponds and seasonally wet areas	96	(7)	(4)	(10)	(21)	75
Rice	22,693	(970)	(1,541)	(5,577)	(8,087)	14,606
Canals (all)	1,778	(117)	(72)	(215)	(404)	1,374
Total	24,567	(1,094)	(1,617)	(5,802)	(8,512)	16,055

(#) decrease in acreage

Source: Habitat and Land Use Assessment Database (CH2M HILL, 2002).

implementing the HCP are presented in Table 5-1. Portions of Sacramento County and Sutter County outside of the urban development areas would not be affected by urban development permitted under the HCP and are assumed to continue to provide habitat for snakes as rice fields or in managed marsh in the habitat reserve system created under the HCP. Under the planned development scenario, habitat for the giant garter snake would be lost on the fringes of the basin (i.e., City of Sacramento and the Industrial-Commercial Reserve) with an extensive area in the middle and northwestern portion remaining as habitat predominantly as rice or managed marsh.

About 16,055 acres of potential habitat for giant garter snakes would remain in the Natomas Basin (assuming no change in land use in Sacramento County other than at MAP), a reduction of 8,512 acres from the existing level of 24,567 acres. With HCP implementation, permanent habitat reserves would be created consisting of 4,375 acres of rice and 2,187.5 acres of managed marsh. The rice within the reserves would most likely be derived from existing rice fields. Thus, 4,375 of the 14,606 acres of rice projected in the basin under the future condition would be incorporated into the reserve system. The 2,187.5 acres of managed marsh could be created from existing rice fields or lands that do not currently provide habitat for giant garter snake. If all of the managed marsh was derived from rice, the net reduction in the acreage of habitat for giant garter snake would be the 8,512 acres attributable to urban development. If all of the managed marsh component of the habitat reserves was created from non-habitat, then the net reduction habitat for giant garter snake would be about 6,324.5 acres.

The land use analysis shows a reduction of 8,512 acres in land use types used by the giant garter snake in the Natomas Basin; however, the acreage of habitat loss probably would be less than this amount because giant garter snakes predominantly use field edges. Managed marsh habitat would be created with implementation of the HCP. The conceptual designs for 1,296 acres of reserve lands already acquired include creating marsh habitat with a high degree of edge habitat (Natomas Basin Conservancy, 2000). Because of the large amount of edge in the managed marsh, the managed marsh would provide a greater amount of useable habitat than an equivalent acreage of rice.

Although rice provides important habitat for giant garter snakes, the managed-marsh habitat reserves created under the HCP are expected to provide greater quality habitat

(on an acre-for-acre basis) than acreage cultivated for rice. Some of the limitations of rice in providing habitat for giant garter snake are described below.

- Rice fields do not provide habitat for giant garter snakes until late spring when the rice plants have grown enough to provide cover and prey levels have developed. Use of rice fields by giant garter snakes is relatively low until summer when the rice plants are established (Wylie and Casazza, 2000).
- Rice fields typically are drained in September, and habitat for snakes can become limited to canals and drains during the last weeks of their active period (Wylie and Casazza, 2000).⁴
- Agricultural practices (tilling, grading, and harvesting) and canal maintenance practices in support of agriculture can directly kill or injure snakes (Leidy, 1992).
- Rice fields are periodically rotated to other crops or fallowed and, therefore, do not provide stable, reliable habitat over time. Furthermore, fluctuations in the amount and distribution of rice could affect the distribution, survival, and reproductive success of giant garter snake.

The managed marsh would be designed and managed specifically to provide optimal habitat conditions for giant garter snake and avoid these limitations. Design features/management practices of managed marsh habitat that would benefit giant garter snakes include:

- A high amount of wetland/upland edge habitat to maximize the amount of useable habitat.
- Potholes (i.e., areas of deeper water) to provide habitat in late summer/fall after the rice fields have been drained
- A water management regime that provides habitat throughout the snakes' active period.
- Year-round wetland habitat to maintain prey populations and avoid a delay in development of prey populations in the spring when snakes emerge from hibernation.
- Integration of upland habitat with marsh habitat such that snakes are not exposed to hazards such as crossing roads when they move into overwintering habitats
- Absence of mortality sources associated with rice production (e.g., canal maintenance activities, pesticide use)

Finally, the creation of marsh and upland habitat in the reserves would emphasize restoration to a natural marsh ecosystem. The habitat reserves would replace rice, an artificial, intensively managed monoculture, with a native ecosystem characterized by a complex structure and high habitat diversity. With the recreation of the native ecosystem, the habitat reserves would provide the natural habitat conditions under which the giant

⁴ There is some uncertainty over whether the timing of draining rice fields is beneficial or detrimental. It has been suggested that the timing of rice field dewatering benefits snakes by concentrating prey in the ditches such that snakes can feed heavily prior to entering hibernation (City of Sacramento et al., 2001).

garter snake evolved. As noted above, natural marsh habitat is nearly absent from the Natomas Basin, consisting of only about 97 acres. Under the HCP, marsh habitat acreage would be increased by over 20 times. Wylie and Casazza (2000) found that giant garter snakes at Fisherman's Lake seldom ventured into surrounding rice fields. These observations indicate that snakes were able to find adequate resources (e.g., prey, basking sites, cover, overwintering habitat) in Fisherman's Lake to support themselves. Wylie and Casazza (2000) suggested that created marsh, such as would be created under the HCP, similarly could fulfill these habitat requirements for snakes.

The rice fields in the reserve system also could provide higher habitat quality than the rice fields that would be lost to urban development. Rice in the reserve system would be managed using snake-friendly techniques, including:

- Maintenance of rice checks, berms, and other water control structures in as natural a state as practicable by limiting mowing or herbicide treatment
- Maintenance of prey species (e.g., mosquito fish) in or near the rice fields through appropriate management
- Other measures, as appropriate

Specific measures for managing rice fields in the reserve system would be determined by the Technical Advisory Committee.

In addition to the direct removal of habitat, urban development can indirectly impact snakes through increased predation and vehicle strikes as follows.

- Free-ranging domestic cats often are introduced to an area by the establishment of residential areas. Residential development close to areas inhabited by snakes can lead to increased predation by cats. While predation by cats on giant garter snakes is believed to occur, its impact on snake populations has not been determined.
- Mortality to snakes from vehicle strikes also has been reported (Leidy, 1992). Snakes could experience increased mortality from increased motor vehicle activity associated with urbanization.

Under the HCP, habitat reserves would be located at least 800 feet from urban areas and areas designated for urban development in applicable plan (unless a smaller distance is approved by CDFG and USFWS on a case-by-case basis) and a buffer at least 30 feet wide established within the reserve between marsh habitat and roadways. By locating habitat for snakes away from urban areas and creating a buffer between snake habitat and roads, death or injury to snakes from vehicle strikes, as well as predation by cats could be reduced although not eliminated.

In summary, implementation of the HCP is expected to result in a net loss of habitat for giant garter snake in the Natomas Basin. The reduction in habitat value, however, is expected to be less than the acreage reduction because:

- Snakes primarily use the edges of rice fields, not the entire rice field. Because snakes would not use all the acreage identified as rice habitat, the actual amount of giant garter

snake habitat in the Natomas Basin is not directly correlated to the changes in land use acreages that resulted from the land use analysis

- Managed marsh habitat would provide more habitat for snakes than rice fields on an acre-for-acre basis because of the larger amount edge habitat
- Managed marsh habitat would be designed to accommodate year-round habitat requirements, as previously described
- Rice in the reserve system would be managed to provide better habitat quality than existing rice fields.

Effects of Construction Activities

Urban development and the construction of habitat reserves is anticipated to affect habitat for the giant garter snake as described above. Giant garter snakes also could be killed or injured during construction by vehicle strikes on roads, crushing beneath heavy construction equipment, or entombment in their winter retreats. Death or injury to snakes has been reported because of vehicle strikes on roads (Leidy, 1992) and excavation from winter retreats (Wylie and Casazza, 2000). The HCP includes measures to avoid and minimize direct loss of giant garter snakes from construction (Section V). Both the Conservancy and individual developers would implement the following measures to avoid and minimize the potential to take snakes during construction activities.

- **Timing restrictions:** No grading, excavating or filling activities will take place within 30 feet of existing giant garter snake habitat between October 1 and May 1, unless approved by CDFG. By conducting earth-moving activities during the summer months when snakes are active, it is expected that snakes in the construction area will be able to avoid construction equipment such that direct injury or mortality would be avoided. Further, snakes will not be in their winter retreats where they are vulnerable to injury during earth-moving activities.
- **Dewatering requirements:** Dewatering of existing habitat will begin after November 1, but no later than April 1 of the following year. All water must be removed from existing habitat by April 15, or as soon thereafter as weather permits, and the habitat will be kept dry without any standing water for 15 consecutive days after April 15 and prior to excavating or filling the dewatered habitat. By dewatering habitat between November 1 and April 1, snakes would not be attracted to construction zones when they emerge from their winter retreats. If habitat must be dewatered after April 15, it must remain dry for 15 consecutive days prior to excavating or filling the habitat. Snakes have been found to leave habitat within a few days of dewatering (USFWS, 1999a). By waiting for 15 days after dewatering, it reasonable to expect that any snakes would have left the construction zone prior to the start of construction activities and injury to snakes would be avoided.

In combination, these measures would minimize direct injury and mortality to giant garter snakes.

Effects of O&M Activities

Water Agencies

Canals and ditches provide important habitat for giant garter snakes in the Natomas Basin. In Wylie and Casazza's (2000) radio-telemetry study, about half of the snake locations during the summer were in rice and half were in ditches. In the spring (before the rice fields had developed), however, the majority of snake locations were in ditches. During the spring and fall, ditches can be the only habitat available to snakes in rice producing areas (Wylie and Casazza 2000). In addition to providing habitat, ditches could be important in maintaining population connectivity.

RD 1000 and Natomas Mutual are responsible for maintaining and operating the ditches and canals in the Natomas Basin. The quality of ditches as habitat for snakes can be influenced by operation and maintenance practices that affect the amount of vegetation, the presence of water in the ditches, and the availability of burrows in canal banks that snake's can use for escape or as winter retreats. Further, giant garter snakes can be killed or injured by maintenance equipment, such as mowers and construction equipment used for sediment removal and bank resloping (Leidy, 1992).

Under the HCP, RD 1000 and Natomas Mutual would implement practices to avoid and minimize adverse effects to giant garter snakes from their operation and maintenance activities. These measures include:

- **Restrictions on timing of management activities.** Where giant garter snakes are known to exist, maintenance activities (excluding vegetation control, road maintenance, and rodent control) will be restricted to after May 1 and before October 1 in any calendar year. By conducting in-channel maintenance activities during the summer when the snakes are active, it is expected that snakes will be able to avoid equipment and thereby avoid injury. Further, the potential for snakes to be killed or injured in their winter retreats by ditch cleaning (e.g., sediment removal) would be avoided.
- **Dewatering of ditches/canals identified for maintenance.** Dewatering two weeks prior to construction removes an essential element (aquatic features) of giant garter snake habitat. Snakes have been found to leave dewatered habitat within a few days of dewatering such that it is reasonable to expect that snakes would leave the construction area in search of more suitable habitat and would not reenter the construction area.
- **Restrictions on management intensity.** RD 1000 and Natomas Mutual will limit canal and ditch maintenance activities (excluding vegetation control, road maintenance, and rodent control) during any calendar year to not more than ten percent (10%), of the total miles of canals and ditches within each Water Agencies' respective service area. Vegetation control would be limited to one side of the ditch per year. Fitch (1940, cited in Leidy, 1992) noted that the banks of ditches where he was searching for snakes were usually overgrown with tules, willows and weeds making it difficult to see snakes. Later, Hansen (1980, cited in Leidy, 1992) reported that canals cleared of vegetation were rarely used by snakes, while ditches supporting tules and willows appeared to be good habitat. Thus, vegetation that potentially provides habitat for snakes would be retained on one side of the ditch and the ditch could continue to provide cover for snakes following maintenance activities.

- Management of vegetation control measures in giant garter snake habitat. Burning would be restricted to October 1 through April 30, when snakes are active and would be expected to leave areas treated through burning. When mowing for weed control, vegetation would be retained at least 6 inches tall. By keeping mower blades at least 6 inches high, the blades would not contact snakes on the banks.

Natomas Basin Conservancy

Some of the activities conducted by the conservancy to manage the habitat reserves have the potential to kill or injure giant garter snakes. For example, the conservancy conducts ditch and canal maintenance activities similar to those conducted by RD 1000 and Natomas Mutual to maintain appropriate water delivery and drainage from rice and managed marsh units. The conservancy will implement take avoidance measures to minimize potential take that may occur during on reserve lands (e.g., road kills, take during construction of managed marsh wetlands, etc.). To accomplish this, the conservancy will, where applicable, ensure that all take avoidance measures described in Chapter V (e.g., dewatering of irrigation ditches owned by the conservancy) are implemented during management of reserve lands. The Conservancy also will ensure that all such take avoidance measures as are necessary and appropriate are included in reserve management plans, as well as additional measures determined to be necessary during the development of management plans.

In managing rice fields on the habitat reserves, the conservancy will implement Best Management Practices (BMPs) to enhance habitat values and minimize the potential for injury to snakes. The BMP's include guidelines related to vegetation management (including weed management, treatment of crop stubble through burning, and disking and use of herbicides), and maintenance of those ditches that are owned by the conservancy (time of maintenance, alternating bank maintenance on an annual basis). These practices would have similar beneficial effects for snakes as described for the water agencies.

Overall Effects on Giant Garter Snake

The current distribution and abundance of the giant garter snake is considerably reduced from former times (FR 58:54053). The population reduction and range restriction has been largely attributed to conversion and loss of wetland habitat in the Central Valley. Loss of habitat is considered the primary threat to the persistence of giant garter snake and the primary factor limiting the abundance and distribution of the population (USFWS, 1999a).

Within suitable wetland habitat, the factors determining the population size and distribution of giant garter snake are poorly understood. Prey availability can influence the total population size as well as reproductive success. Whether prey availability drops to levels that limit the population, however, has not been determined. Hypothesized or documented sources of mortality include predation, dormant season flooding, road kill, mechanical injury, pest control, collection and vandalism, disease and parasites, and toxic substances (Leidy, 1992). The relative importance of these sources of mortality in determining the size, distribution, and trend of the population remains uncertain.

The Natomas Basin is located within the American Basin population area of the giant garter snake which, when combined with the Colusa Basin and Sutter Basin, represents the largest extant population of giant garter snakes. Giant garter snakes have been reported in the

American Basin since the 1970s (Leidy, 1992). Recent investigations of giant garter snakes in the Natomas Basin found a wide range of size classes (Wylie and Cassaza, 2000). The range of size classes suggests that the population is reproducing, juveniles are being recruited into the population, and adults are surviving to older age classes.

Implementation of the HCP is expected to result in a net loss of habitat for giant garter snake. Despite a net loss of habitat, implementation of the HCP would encourage the persistence of giant garter snakes in the Natomas Basin for several reasons. First, the loss of habitat is expected to be less than the average loss predicted using the GIS because: (1) the acreage of rice that is used by snakes is likely overestimated; and (2) the managed marsh habitat would be designed to provide a large amount of edge habitat. Second, the quality of both the managed marsh and rice in the reserve system would be greater than the affected habitat. This greater quality habitat could support a larger population of snakes as a result of better habitat conditions (e.g., more prey) or reduced mortality (e.g., fewer road kills). Third, the habitat reserves would provide habitat that is stable in location, amount, availability, and quality within and among years over the long term, thereby providing conditions conducive to supporting a stable population of giant garter. Fourth, management actions undertaken by RD 1000 and Natomas Mutual would minimize the potential for death or injury of snakes and, more importantly, improve the availability and stability of habitat for snakes in the canal and ditch system over the long term by allowing suitable habitat conditions to persist in the canals and ditches. This habitat would have the dual benefit of providing additional habitat for snakes and travel corridors to maintain population connectivity.

Finally, lands west of Fisherman's Lake would be protected and RD 1000 would prepare a management plan for the lake to maintain or improve its habitat value for species covered by the HCP. In addition, RD1000 will prepare a management plan for Fisherman's Lake that addresses the maintenance and enhancement of its habitat value for giant garter snakes and other species covered by the HCP. Fisherman's Lake is a well-documented area for giant garter snakes. Wylie and Casazza (2000) found that snakes using Fisherman's Lake remained within the lake, and did not exploit surrounding ricelands. They suggest that Fisherman's Lake provided a stable habitat so that snakes rarely needed to leave to fulfill their life requisites. With maintenance of lands around Fisherman's Lake and management to maintain its habitat value, this known population of snakes would be protected. Creation of managed marsh habitat under the HCP would result in additional "stable" habitats, and in combination with Fisherman's Lake and remaining rice fields, encourage the persistence of giant garter snakes in the Natomas Basin.

A primary goal of the HCP is to ensure connectivity between individual reserves, and connectivity between reserves and surrounding agricultural lands. Connections can be provided along land, through water and through air to enable the necessary mobility of species within their ranges. The primary opportunity for connectivity among reserves is the system of channels maintained and operated by RD 1000 and Natomas Mutual. These water agencies have noted that the elimination of existing channels would generally only occur in response to urban development. RD 1000 and Natomas Mutual would manage ditches and canals in a manner that would allow and encourage continued use by snakes.

With regard to basin-wide connectivity, RD 1000 identified key drainage channels within the Basin that would be retained regardless of urban development (see Figure 17 of the

Natomas Basin HCP). With the exception of one property in the northeastern portion of the basin, all of the existing Conservancy lands are interconnected by drainage channels that would remain despite urban development. In addition to these drainage channels, canals and ditches would remain in areas continuing to be in agricultural production. Because snakes readily and routinely use canals and ditches in the Natomas Basin (Wylie and Cassaza, 2000), the canal and drainage systems would provide for movement of snakes among the habitat reserves, thereby minimizing the potential occurrence of adverse effects resulting from small and isolated populations.

Under the HCP, it is reasonable to expect that the creation and management of habitat reserves that support 6,562 acres of habitat for giant garters snake would provide similar or better overall habitat value to that of the 8,512 acres of potential habitat consisting predominantly of rice that would be lost to urban development. Thus, impacts to giant garter snake attributable to the 17,500 acres of urban development covered by the HCP are expected to be mitigated adequately. The conservation strategy of the HCP mitigates the impacts to giant garter snakes from the planned development and is an important component in maintaining giant garters snakes in the Natomas Basin.

5.2 Northwestern Pond Turtle (*Clemmys marmorata marmorata*)

5.2.1 Species Description

The northwestern pond turtle is considered a Species of Concern by USFWS and is a state Species of Special Concern. The turtle is uncommon to common in suitable aquatic habitat throughout California, west of the Sierra-Cascade crest. Western pond turtles are active all year where climates are warm but are known to hibernate in cold climates. This species is typically associated with permanent or nearly permanent water in a wide variety of habitat types including permanent ponds, lakes, streams, irrigation ditches, or permanent pools along intermittent streams. Primarily omnivorous, the western pond turtle feeds on aquatic plant material, including pond lilies, beetles and a variety of aquatic invertebrates as well as fish, frogs, and carrion (Stebbins, 1972; Nussbaum et al., 1983). Western pond turtles require basking sites such as partially submerged logs, rocks, mats of floating vegetation, or open mud banks. Hibernation in colder areas occurs underwater in bottom mud. Breeding occurs in large slow-moving streams; eggs are deposited in nests constructed in sandy banks. Western pond turtles are highly aquatic but leave the water for basking and egg-laying. Egg-laying may occur along sandy wetland margins or at upland locations as far as 1,300 feet from water (Holland and Bury, 1992). Hatchling and adult turtles have the potential to overwinter in upland sites (Q.C. Holland, pers. comm.).

The western pond turtle occurs in suitable aquatic habitats west of the crest of the Sierra Nevada in California and in parts of Oregon, Washington, and Mexico (Stebbins, 1985; Zeiner et al., 1988). The northwestern subspecies is generally found from San Francisco Bay north to the Columbia River drainage in Oregon and Washington (57 FR 45761-45762, October 5, 1992). The northwestern pond turtle still occupies most of its historic range. However, populations are declining throughout the range (Holland and Bury 1992) and local populations, particularly of the southwestern subspecies, have been extirpated from many areas within this range (57 FR 45762, October 5, 1992). The few remaining areas in the

western pond turtle's range that support moderate to large viable populations of the northwestern pond turtle are considered threatened (57 FR 45761-45762, October 5, 1992).

There are 117 known occurrences of northwestern pond turtle in California one of which is considered extirpated (CDFG, 2001). Of these, 13 known occurrences are in Sacramento County and 2 are in Sutter County. During habitat mapping surveys (March 2001), many pond turtles were observed along the Natomas Main Drain, suggesting that the Natomas Basin supports a limited northwestern pond turtle population. No systematic surveys for pond turtles in the Natomas Basin have been conducted to date. Pond turtles have been reported on some of the Conservancy's lands.

The canals throughout the Natomas Basin are considered suitable aquatic habitat for pond turtles. Currently, there are about 250 miles of canals and ditches in the Natomas Basin. Fisherman's Lake in the southwestern portion of the Basin is high-quality aquatic habitat for pond turtles. Because most of the Basin is developed agricultural land or commercial/residential development, many of the potential breeding habitats have been eliminated. Despite this, potential breeding habitat occurs along many of the canals and aquatic habitats.

5.2.2 Environmental Effects

Effects of Changes in Habitat

Western pond turtles are highly aquatic and are closely associated with wetland and aquatic habitats. In the Natomas Basin, potential habitat consists of canals, rice, ponds and seasonally wet areas, and riparian. Turtles use upland areas for hibernation and for nesting. Upland areas used by turtles typically are close to aquatic habitats but can be as far as 1,300 feet from water.

The amount of rice fields, irrigation canals/ditches, ponds and seasonally wet areas, and rice is used to represent total habitat for western pond turtle (both marsh and upland habitat) in the Natomas Basin. For rice and ponds and seasonally wet areas, the GIS did not distinguish small-scale features such as rice checks, berms and road embankments that could provide upland habitat. Rather, these features were incorporated into the overall habitat designation such that the acreage estimates for rice and ponds and seasonally wet areas encompassed both marsh and upland areas. The acreage estimates for canals/ditches also included both the wetted portion of the canal and the adjacent embankments that could provide upland habitat for turtles. The classes of canals and drains (from Tables 4-2 and 4-3) that provide potential habitat for northwestern pond turtle and the changes in acreage from implementing the HCP are presented in Table 4-8. Based on the habitat and land use assessment conducted for this analysis, the Natomas Basin supports about 24,691 acres of habitat (marsh and upland combined) for pond turtles (Table 5-2).

TABLE 5-2
Change in Potential Habitat for Northwestern Pond Turtle (acres)

Habitat Class ^a	Baseline	City of Sacramento	Metro Air Park	Sutter County	Total Change	Future Condition
Ponds and seasonally wet areas	96	(7)	(4)	(10)	(21)	75
Rice	22,693	(970)	(1,541)	(5,577)	(8,087)	14,606
Riparian	124	(24)	0	0	(24)	100
Canals (all)	1,778	(117)	(72)	(215)	(404)	1,374
Total	24,691	(1,118)	(1,617)	(5,802)	(8,536)	16,155

(#) decrease in acreage

Source: Habitat and Land Use Assessment Database (CH2M HILL, 2002).

Under the HCP, potential habitat for western pond turtle would decline by about 8,536 acres as a result of planned urban development. This reduction in habitat would predominantly consist of rice fields, although about 404 acres would be canals. No change in riparian habitat would occur because the 24 acres of riparian habitat predicted to be lost in the City of Sacramento occurs along Fisherman's Lake. Under the Settlement Agreement and as part of the HCP, lands immediately adjacent to Fisherman's Lake would not be developed. The riparian habitat adjacent to Fisherman's Lake, thus, would be retained.

About 16,155 acres of potential habitat for western pond turtles would remain in the Natomas Basin (assuming no change in land use in Sacramento County other than at MAP and no loss of riparian in the City as described above), a reduction of 88,536 acres from the existing level of 24,691 acres. Under the HCP, permanent habitat reserves would be created consisting of 4,375 acres of rice and 2,187.5 acres of managed marsh. The rice within the reserves would most likely consist of existing rice fields. Thus, 4,375 of the 14,606 acres of rice projected in the basin under the future condition would be incorporated into the reserve system. The 2,187.5 acres of managed marsh could be created from existing rice fields or lands that do not currently provide habitat for western pond turtle. If all of the managed marsh was derived from rice, the net reduction in the acreage of habitat for western pond turtle would be the 8,536 acres attributable to urban development. If all of the managed marsh component of the habitat reserves was created from non-habitat, then the net reduction habitat for western pond turtle would be about 6,348.5 acres.

The 2,187.5 acres of upland habitat in the habitat reserves could be equally important to supporting pond turtles on the habitat reserves than the managed marsh. Pond turtles require upland sites for overwintering and nesting. The availability and suitability of nesting habitat could be contributing to poor recruitment in western pond turtle populations (Jennings and Hayes 1994). The habitat reserves would provide this critical element in the maintenance of pond turtle populations.

In addition to reducing habitat availability, urban development in areas adjacent to areas inhabited by pond turtles can indirectly impact this species. Free-ranging domestic cats are often introduced to an area by the establishment of residential areas. Residential development close to areas inhabited by turtles can lead to increased predation by cats.

While predation by cats on western pond turtles has not been specifically identified as a concern, predation by other terrestrial predators (e.g., non-native red fox and raccoons) has been noted (Jennings and Hayes, 1994). Mortality to turtles from vehicles also is possible and turtles could experience increased mortality from increased motor vehicle activity associated with urbanization. Under the HCP, habitat reserves would be located at least 800 feet from urban areas and areas designated for urban development in applicable plan (unless a smaller distance is approved by CDFG and USFWS on a case-by-case basis) and a buffer at least 30 feet wide established within the reserve between marsh habitat and roadways. By locating habitat reserves away from urban areas, the potential for death or injury to turtles from vehicle strikes, as well as predation by cats could be reduced although not eliminated.

Despite the net reduction in the total amount of potential habitat, the HCP likely would improve habitat conditions for western pond turtles through the creation and protection of marsh complexes on the habitat reserves. Rice fields provide poor habitat quality for western pond turtles, as they are intensively managed monocultures with little structural or biological diversity. In particular, an abundance of basking sites (a key element of pond turtle aquatic habitat) is lacking in rice fields. Beneficial components of the habitat reserves include:

- Long-term certainty of habitat availability. Created marsh habitat would be protected in perpetuity.
- Higher quality habitat than rice. Created marsh habitat would provide all essential habitat elements for northwestern pond turtle (e.g., basking sites, cover, and prey availability).
- Nearby suitable and undisturbed nesting and overwintering habitat.
- Provision of large areas of contiguous, suitable habitat.
- Reduced exposure to agricultural practices. Current agricultural practices involve the routine use of pesticides and fertilizers as well as exposure to heavy farm machinery (e.g., disking or harvesting). The created marsh would not be subject to this type of maintenance and rice would be managed using wildlife-friendly techniques.
- The Conservancy would consult with pond turtle experts during implementation of the HCP to identify management actions to further improve habitat quality for pond turtles.

Lastly, under the Settlement Agreement and HCP, lands adjacent to Fisherman's Lake would be protected and RD 1000 would prepare a management plan for Fisherman's Lake to maintain and/or improve its habitat value for species covered by the HCP. Fisherman's Lake is known to be inhabited by pond turtles. With acquisition of the buffer lands adjacent to the lake and beneficial management practices implemented by RD 1000, the probability of this population persisting would be improved.

Effects of Construction Activities

Urban development and the construction of habitat reserves is anticipated to reduce the amount of habitat for western pond turtle in the Natomas Basin as described above. Pond turtles could be killed or injured during the construction by vehicle strikes on roads,

crushing beneath heavy construction equipment, or entombment in their winter retreats. Measures in the HCP to avoid and minimize these types of direct impacts to giant garter snakes also would benefit pond turtles because of their similar habitat requirements and life history traits. The avoidance measures for giant garter snakes would have similar beneficial effects to pond turtles.

Effects of O&M Activities

Water Agencies

Operation and maintenance activities by RD 1000 and Natomas Mutual could affect western pond turtles because these activities typically focus on canals and drains that provide suitable habitat for this species. Pond turtles could be killed or injured by construction equipment used for sediment removal. O&M activities also could result in the removal of bank and emergent vegetation, important components of cover for the northwestern pond turtle.

Under the HCP, RD 1000 and Natomas Mutual would implement measures to avoid and minimize potential impacts of O&M activities on giant garter snake. Pond turtles have similar seasonal activity patterns and habitat requirements as giant garter snakes. The effects of the water agencies' O&M activities (including implementation of the avoidance and minimization measures of HCP) on pond turtles would be the same as described for giant garter snakes.

Natomas Basin Conservancy

Some of the activities conducted by the Conservancy to manage the habitat reserves have the potential to kill or injure pond turtles. For example, the Conservancy conducts ditch and canal maintenance activities similar to those conducted by RD 1000 and Natomas Mutual to maintain appropriate water delivery and drainage from rice and managed marsh units. The Conservancy will implement take avoidance measures to minimize potential take that may occur during on reserve lands (e.g., road kills, take during construction of managed marsh wetlands, etc.). To accomplish this, the Conservancy will, where applicable, ensure that all take avoidance measures described in Chapter V (e.g., dewatering of irrigation ditches owned by the Conservancy) are implemented during management of reserve lands. The Conservancy also will ensure that all such take avoidance measures as are necessary and appropriate are included in reserve management plans, as well as additional measures determined to be necessary during the development of management plans.

In managing rice fields on the habitat reserves the Conservancy will implement BMPs to enhance habitat values and minimize the potential for injury to pond turtles. The BMPs include guidelines related to vegetation management (including weed management, treatment of crop stubble through burning, and disking and use of herbicides), and maintenance of those ditches that are owned by the Conservancy (time of maintenance, alternating bank maintenance on an annual basis). These practices would have similar effects for pond turtles as described for the water agencies.

Overall Effects on Northwestern Pond Turtle

Jennings and Hayes (1994) characterized western pond turtles as endangered from the Salinas River south along the California coast, and from the Mokelumne River south in inland portions of the state. In the remainder of the state, Jennings and Hayes (1994) considered the species to be threatened. Although loss of habitat has probably been the

primary cause of population reductions of this species, other factors threaten the persistence of pond turtles in remaining habitat. Pond turtles in many locales do not appear to be reproducing well as evidenced by populations increasingly dominated by adults (Jennings and Hayes, 1994). Potential contributors to their poor recruitment include predation on hatchlings and juveniles by bullfrogs and introduced fishes, competition with introduced fish, lack of suitable nesting habitat, and impacts to nesting habitat during egg incubation (e.g., agricultural practices, grazing) (Jennings and Hayes, 1994).

The current status of western pond turtle in the Natomas Basin and factors limiting the population are uncertain. Nevertheless, the HCP would be expected to improve the likelihood that pond turtles would persist in the Natomas Basin. The majority of the potential habitat that would be lost to urban development would be rice. Rice provides poor quality aquatic habitat for western pond turtle and suitable nesting and overwintering habitats might not be available near many rice fields. The habitat reserves created under the HCP would provide high-quality aquatic habitat interspersed with and in close proximity to upland habitat suitable for nesting and overwintering. As part of the HCP, the Conservancy would work with experts on pond turtles to improve and maintain habitat for pond turtles. Through these consultations, the Conservancy will be able to avoid or minimize factors that are believed to reduce recruitment. Pond turtles are known to occur on some of the Conservancy's lands. If successfully-reproducing populations of pond turtles can be established and/or maintained on the habitat reserves, it would substantially benefit this species given its poor recruitment success elsewhere in its range and potentially in the Natomas Basin.

The habitat reserves would improve the likelihood that successfully-reproducing populations of turtles will be supported in the Basin. In addition, areas currently known to be inhabited by ponds turtles (East Main Drain and Fisherman's Lake) will remain under the HCP. Under the HCP, lands adjacent to Fisherman's Lake would be managed by the Conservancy for habitat values. Under the Settlement Agreement, RD 1000 will prepare a management plan for Fisherman's Lake to maintain its habitat values for covered species. The East Main Drain would not be affected by urban development. If turtles are currently reproducing in these areas, they could persist under the HCP.

5.3 White-faced Ibis (*Plegadis chihi*)

5.3.1 Species Description

The white-faced ibis is considered a Species of Concern by the USFWS and is a state Species of Special Concern. The white-faced ibis is found in the Sacramento area during its migration. This species forages in fresh emergent wetland, shallow flooded pond margins, and muddy ground of wet meadows and irrigated, or flooded, pastures and croplands. The white-faced ibis requires extensive marshes for nesting (Zeiner et al., 1990). Large tule stands surrounded by open water provide high-quality nesting habitat for this species. The white-faced ibis typically nests in dense tule and cattail stands, but would sometimes nest in trees with other colonial-nesting species (Eckert, 1981). The white-faced ibis winters mainly in San Joaquin Valley and Imperial Valley, but is recorded widely as a transient (Zeiner et al., 1990). The largest breeding colonies in the Central Valley have been reported

from the Mendota Wildlife Area and the Colusa National Wildlife Refuge. The wintering population concentrates near Los Banos in Merced County (McCaskie et al., 1979). Historically, the white-faced ibis was a locally common summer resident in California and its breeding distribution was centered in the San Joaquin Valley. White-faced ibis populations have declined in California, probably due to habitat deterioration or removal.

There are seven known occurrences (rookeries) in California (CDFG, 2001). There are no known nesting occurrences in Sutter or Sacramento Counties. The nearest known nesting occurrence is in Yolo County, north of the City of Woodland. No suitable nesting habitat occurs in the Natomas Basin for white-faced ibis, although suitable winter foraging habitat (i.e., rice, alfalfa, and other agricultural fields) exists in the Natomas Basin for this species. In the Sacramento Valley, wintering ibis were very rare in the 1970s with the highest counts numbering only 11 birds in 1978 and 1979. In 1996, Hickey and Shufford estimated that a minimum of 10,000 to 11,000 ibis were in the Sacramento Valley (Thomas Reid Associates, 2000). White-faced ibis are now common winter visitors to the Natomas Basin, but are not known to breed in the basin.

5.3.2 Environmental Effects

Effects of Changes in Habitat

White-faced ibis winter in the Natomas Basin. Potential foraging habitat includes alfalfa, rice, canals, and ponds and seasonally wet areas. The habitat classes (from Tables 4-3 and 4-4) that provide potential habitat for white-faced ibis and the changes in acreage from implementing the HCP are presented in Table 5-3. The Natomas Basin supports about 25,000 acres of these habitats (Table 5-3).

TABLE 5-3
Change in Potential Habitat for White-faced Ibis (acres)

Habitat Class ^a	Baseline	City of Sacramento	Metro Air Park	Sutter County	Total Change	Future Condition
Alfalfa	371	0	0	0	0	371
Ponds and seasonally wet areas	96	(7)	(4)	(10)	(21)	75
Rice	22,693	(970)	(1,541)	(5,577)	(8,087)	14,606
Canals (all)	1,778	(117)	(72)	(215)	(404)	1,374
Total	24,938	(1,094)	(1,617)	(5,802)	(8,512)	16,426

(#) decrease in acreage

Source: Habitat and Land Use Assessment Database (CH2M HILL, 2002).

Under the HCP, urban development would convert about 8,512 acres of potential habitat for white-faced ibis to non-habitat. Most of the reduction in potential habitat would be rice. As explained for giant garter snakes, the characteristics and management of rice can limit its value to wildlife. For white-faced ibis (which currently occur in the Natomas Basin during winter), only flooded rice fields in the winter provide habitat; fields that are not flooded provide little or no value. White-faced ibis are associated with emergent wetland habitats,

particularly for nesting. Native marsh habitat has been largely eliminated from the Natomas Basin. While they are able to exploit flooded rice fields and other agricultural field types (e.g., alfalfa) as wintering habitat, these habitats are not suitable for nesting.

The reduction in potential foraging habitat would be at least partially offset by creation and long-term protection of marsh and upland habitat in the reserves. Under the HCP, 8,750 acres of permanent habitat reserves would be created consisting of 4,375 acres of rice, 2,187.5 acres of managed marsh, and 2,187.5 acres of upland habitat. All of this habitat could be used by white-faced ibis. There would still be a net loss of habitat for white-faced ibis in the Natomas Basin, but it is expected that the habitat in the reserves would be of higher quality than the rice fields and canals converted to urban development. Marsh and upland habitat in the habitat reserves would be managed to restore native marsh/upland habitat and to promote wildlife habitat values.

White-faced ibis are more flexible in their use of foraging habitat than nesting habitat and probably are not limited by foraging habitat availability in winter. Under the HCP, foraging habitat would remain abundant in the Natomas Basin (about 16,500 acres plus 8,570 acres in the habitat reserves) and in agricultural areas adjacent to the basin. As a result, the decline in foraging habitat would not be expected to adversely affect ibis using the Natomas Basin. Further, with their long-term protection and management for habitat that is stable in quality and location, the reserves would support continued foraging by white-faced ibis in the Natomas Basin.

White-faced ibis are known to nest in the Central Valley but have not been reported to nest in the Natomas Basin. Managed marsh habitat on the habitat reserves could attract white-faced ibis to nest. White-faced ibis typically nest in large emergent wetlands with minimal disturbance. These types of conditions would be created in the habitat reserves and could result in the establishment of additional nesting colonies.

Effects of Construction Activities

Construction activities would be required for urban development and for habitat creation/restoration actions for the habitat reserves. These activities have little potential to adversely affect white-faced ibis. This species is not known to nest in the Natomas Basin, but rather uses the basin for foraging during the winter. Potential effects would be limited to displacement of birds foraging or roosting on a field during the initial phases of construction when fields are graded. Because grading typically is done in the spring and summer and ibis occur in the basin in winter, no adverse effects to foraging or roosting birds are expected during construction activities.

White-faced ibis could nest in the Natomas Basin in the future and disturbance or displacement of nesting birds could occur from construction for urban development on nearby properties or habitat creation. Because habitat reserves are to be located at least 800 feet away from urban development or areas designated for urban development unless an exception is granted, the potential for this type of impact would be minimized. Finally, under the HCP, surveys would be conducted prior to construction activities. If white-faced ibis occur, disturbance would be avoidance during the nesting season to the maximum extent possible. Similarly, the Conservancy would avoid disturbance to white-faced ibis nest

sites during reserve management and enhancement activities to the maximum extent practicable.

Effects of O&M Activities

Water Agencies

White-faced ibis could forage in canals and ditches, and O&M activities by RD 1000 and Natomas Mutual could displace ibis foraging in the drains. Avoidance and minimization measures for the giant garter snake would reduce the potential for O&M activities to affect ibis. These measures include:

- **Implementation of timing restrictions.** Canal and ditch maintenance primarily would be conducted during the summer. White-faced ibis currently are winter residents in the Natomas Basin. By conducting O&M activities during the summer, potential impacts to ibis would be avoided.
- **Dewatering of ditches/canals identified for maintenance.** By dewatering canals and ditches two weeks prior to construction, white-faced ibis would seek foraging opportunities in other locations and therefore would not be in the vicinity when maintenance/construction activities are conducted.
- **Restrictions on management intensity.** RD 1000 and Natomas Mutual will limit canal and ditch maintenance activities (excluding vegetation control, road maintenance, and rodent control) during any calendar year to not more than ten percent (10%), of the total miles of canals and ditches within each Water Agencies' respective service area. Vegetation control would be limited to one side of the ditch per year. Thus, vegetation that potentially provides habitat for white-faced ibis would be retained on one side of the ditch and the ditch could continue to provide habitat for white-faced ibis.

Natomas Basin Conservancy

Use of the Natomas Basin by white-faced ibis currently consists of wintering and migrating birds. At least over the short-term, white-faced ibis would be expected to use the habitat reserves only for foraging and potentially roosting during the winter or migration. Management actions could temporarily displace foraging birds, but this minor displacement would not have adverse effects on white-faced ibis as these birds are typically very mobile in their use of foraging habitat during winter and migration.

In the event that white-faced ibis nest on Conservancy lands in the future, management activities could disturb and displace nesting birds. If ibis are found to nest on the habitat reserves, the Conservancy would avoid disturbing nesting birds during O&M activities.

Overall Effects on White-faced Ibis

Breeding white-faced ibis populations declined in distribution and abundance during the 1960s and 1970s, especially in the western U.S. (Ryder and Manry, 1994; Shuford et al., 1996). The primary reason for the decline of the white-faced ibis as a nesting species in California was the loss of extensive marsh habitats (Remsen, 1978; Shuford et al., 1996). Pesticides also are believed to have contributed to population declines in the 1960s and 1970s. Since the 1980s, however, there has been an increase in western white-faced ibis populations as a result of improved nesting habitat management, increased planting of alfalfa, and a ban on DDT and other pesticide use in the early 1970s. In California, the winter

TABLE 5-4
Change in Potential Habitat for Tricolored Blackbird (acres)

Habitat Class ^a	Baseline	City of Sacramento	Metro Air Park	Sutter County	Total Change	Future Condition
Total Nesting	1,998	(148)	(76)	(225)	(449)	1,549
Foraging Habitat Only						
Alfalfa	371	0	0	0	0	371
Non-rice Crops	16,686	(4,663)	(325)	(1,529)	(6,517)	10,169
Grassland	886	(427)	0	(134)	(560)	325
Pasture	674	(23)	(22)	(101)	(147)	527
Rice	22,693	(970)	(1,541)	(5,577)	(8,087)	14,606
Total Foraging	41,310	(6,083)	(1,888)	(7,341)	(15,311)	25,998

(#) decrease in acreage

Source: Habitat and Land Use Assessment Database (CH2M HILL, 2002).

The projected loss of potential nesting habitat would be offset by creation of 2,187.5 acres of managed marsh in the habitat reserves. The habitat on the reserves would be designed and managed to promote marsh habitat values. The managed marsh would support emergent marsh vegetation including cattails and tules that provide optimal nesting habitat for tricolored blackbird. The habitat reserves also consist of large blocks that would allow development of large areas of marsh vegetation that are preferred by tricolored blackbirds. Tricolored blackbird would benefit from the substantial increase in high quality nesting habitat under the HCP.

In addition to reducing habitat availability, urban development in areas adjacent to areas inhabited by tricolored blackbirds can indirectly impact this species. Free-ranging domestic cats are often introduced to an area by the establishment of residential areas. Tricolored blackbirds are believed to be vulnerable to nest destruction by mammalian predators (Bent, 1958) and residential development close to areas inhabited by tricolored blackbirds could lead to increased predation by cats. Under the HCP, habitat reserves would be located at least 800 feet from urban areas and areas designated for urban development in applicable plan (unless a smaller distance is approved by CDFG and USFWS on a case-by-case basis) and a buffer at least 30 feet wide established within the reserve between marsh habitat and roadways. By locating habitat reserves away from urban areas, the potential for predation by cats could be reduced although not eliminated.

The total amount of potential foraging habitat would decline in the Natomas Basin by about 15,311 acres. This large reduction in potential foraging habitat reflects the catholic foraging habits of tricolored blackbirds. In the Natomas Basin and elsewhere the occurrence and distribution of tricolored blackbird is probably determined by the availability of suitable nesting habitat rather than foraging habitat. Given the current abundance of foraging habitat, but scarcity of nesting habitat in the Natomas Basin, the population size and distribution of tricolored blackbird likely are limited by the availability and distribution of nesting habitat rather than foraging habitat. With about 25,998 acres of foraging habitat remaining in the basin and their ability to use a wide diversity of foraging, the reduction in foraging habitat would not be expected to adversely impact tricolored blackbirds.

Effects of Construction Activities

Construction activities for urban development or associated with habitat creation on the habitat reserves has the potential to disturb nesting birds or directly destroy nests if birds were nesting in vegetation removed for construction. For construction associated with urban development, under the HCP, preconstruction surveys would be conducted. If tricolored blackbirds are found, disturbance to nesting colonies would be avoidance during the nesting season to the maximum extent possible. Similarly, the Conservancy would avoid disturbance to tricolored blackbirds nest sites during reserve management and enhancement activities to the maximum extent practicable.

Effects of O&M Activities

Water Agencies

The water agencies would implement measures to avoid and minimize the effects of their maintenance activities on giant garter snakes. These measures could have some minor benefits to tricolored blackbird. Specifically, the water agencies would limit some of their maintenance activities to 10 percent of the canal and ditch systems annually and where vegetation control is conducted only one side of the canal would be treated annually. These measures would contribute to maintaining vegetation along the canals and ditches that could provide some nesting opportunities for tricolored blackbirds.

O&M effects on tricolored blackbirds are expected to be rare. Canals and drains that would be affected by O&M activities support only limited habitat potentially suitable for tricolored blackbird and this species is rare in the Natomas Basin. As such, they are unlikely to occur in areas where O&M activities are conducted.

Natomas Basin Conservancy

A colony of tricolored blackbirds currently occurs on the Betts-Kismat-Silva property that is part of the Conservancy habitat reserve system. It is likely that tricolored blackbird colonies will become established on other the Conservancy lands as managed marshes develop. Management activities on the habitat reserves supporting tricolored blackbirds have the potential to disturb nesting birds or directly destroy nests if vegetation supporting nesting birds is removed during the nesting season. Under the HCP, the Conservancy would avoid conducting management activities that would disturb nesting tricolored blackbirds between April to July or while birds are present.

Overall Effects on Tricolored Blackbirds

The HCP is expected to benefit tricolored blackbirds. Loss of marsh habitat has been the primary factor in the decline in tricolored blackbird (Kaufman 1996; DeHaven et al., 1975). A major component of the HCP is the creation and protection of marsh habitat. With the limited amount of marsh habitat currently in the basin, the habitat reserves would substantially increase the amount of nesting habitat available to tricolored blackbirds. One colony of tricolored blackbirds is already protected on Conservancy lands. With the creation of marsh habitat, additional colonies likely would establish on the habitat reserves and contribute to increasing the size and distribution of tricolored blackbird in California.

5.5 Swainson's Hawk (*Buteo swainsoni*)

5.5.1 Species Description

The Swainson's hawk is listed as a Threatened species under the state Endangered Species Act. Historically, this species nested throughout lowland California. The current Swainson's hawk nesting distribution, however, is limited to extreme northeastern California, the Central Valley, and a few isolated locations in the Owens Valley (CDFG, 1992, 1994). The Swainson's hawk occurs in California only during the breeding season (March through September) and winters in Mexico and South America.

Swainson's hawks begin arriving in the Central Valley from wintering grounds in March to breed and raise their young. The earliest fledging of young occurs in July and the young remain with the parents until the southern migration in early fall. Swainson's hawk nesting preference is for large valley oaks (*Quercus lobata*), cottonwoods (*Populus fremontii*), or willow (*Salix goodingii*).

Swainson's hawks are opportunistic feeders, flushing prey (birds, rodents and some insects) from fields, pastures and grasslands adjacent to their nests. Swainson's hawks prefer large nesting trees with a panoramic view of their foraging grounds. Foraging habitats, open fields and grasslands, need to be within flying distance (maximum observed is 18 miles) and large enough to support the high densities of microtine rodent populations and birds upon which they feed.

Swainson's hawks have been observed foraging following farm machinery (moving harvester blade or disc) and capturing rodents exposed by ground disturbance (Estep, 1989). Suitable cover types for foraging habitats include, in order of suitability: (1) native grassland; (2) agricultural fields soon after discing; (3) alfalfa and other hay crops; (4) fallow fields; (5) lightly grazed pasture; (6) combinations of hay, grain, and row crops; (7) rice fields prior to flooding and after draining; and (8) heavily grazed pasture. Flooded rice fields were formerly thought to be unsuited for foraging, but recent observations indicate that its system of levees and checks is used by Swainson's hawks (Dave Zezulak, CDFG, pers. comm.) Unsuitable cover types for foraging habitat include vineyards, mature orchards, cotton, thistle in fallow fields and any crop where prey are unavailable due to high vegetation height and density.

Although nest sites are not found exclusively in riparian habitat, more than 87 percent of the known nest sites in the Central Valley are within riparian systems (Estep, 1984; Schlorff and Bloom, 1984). This is primarily a function of tree availability and not a preference for large riparian stands or the presence of other components of a riparian forest. Swainson's hawks also nest in mature roadside trees, isolated individual trees in agricultural fields, small groves of oaks, and trees around farm houses (CDFG, 1992, 1994).

Swainson's hawk nesting in the Natomas Basin occurs primarily in the western portion of the basin (Figure 5-1). Most nest sites are located along the Sacramento River where large trees are available. The most recent survey of the Natomas Basin (SHTAC 2001) shows 35 nest sites along the Sacramento River (22 on the east side and 13 on the west side). Twenty-seven nest sites are located elsewhere in the basin, for a total of 62 nest sites in or

immediately adjacent to the Natomas Basin. Two of these sites are considered abandoned because the nest trees have been removed.

In 2000, the Swainson's Hawk Technical Advisory Committee monitored 24 known nesting sites in the Basin, of which 17 were used in 2000. Of these, only 10 successfully nested in 2000 (i.e., reared young to fledging), producing a total of 20 fledglings (SHTAC, 2000). During 2001 surveys, two new territories were found in the interior of the Natomas Basin and a third new site was found adjacent to the East Main Drainage Canal (SHTAC, 2001). Of the 27 territories in the Basin, 19 were used in 2001.

5.5.2 Environmental Effects

Effects of Changes in Habitat

The Natomas Basin supports both nesting and foraging habitat for Swainson's hawks. For nesting, Swainson's hawks typically use riparian forest habitats where large trees are available, but can use isolated trees or groves of trees outside of riparian zones (SHTAC, 2000). Of the existing land use types in the Natomas Basin (see Section 4.0) Riparian, Oak Groves, and Tree Groves are considered potential nesting habitat for Swainson's hawk. Based on these land use types, the area covered by the HCP supports about 328 acres of nesting habitat for Swainson's hawk. This acreage does not include riparian habitat along the Sacramento River on the westside of the levees, which is outside of the HCP area.

Foraging habitat for Swainson's hawk consists of alfalfa, grasslands, pasture and certain row crops such as tomatoes and sugar beets. Lands designated as "idle" and "ruderal" also provide foraging opportunities for Swainson's hawk. Although Swainson's hawks have been observed to forage along the margins of rice fields when the fields are flooded, rice provides relatively little habitat for Swainson's hawk; therefore, this habitat type is not considered as foraging habitat in this analysis. Based on this characterization, the Natomas Basin supports about 22,051 acres of foraging habitat for Swainson's hawk. The habitat classes (from Tables 4-3 and 4-4) that provide potential nesting and foraging habitat for Swainson's hawk and the changes in acreage from implementing the HCP are presented in Table 5-5.

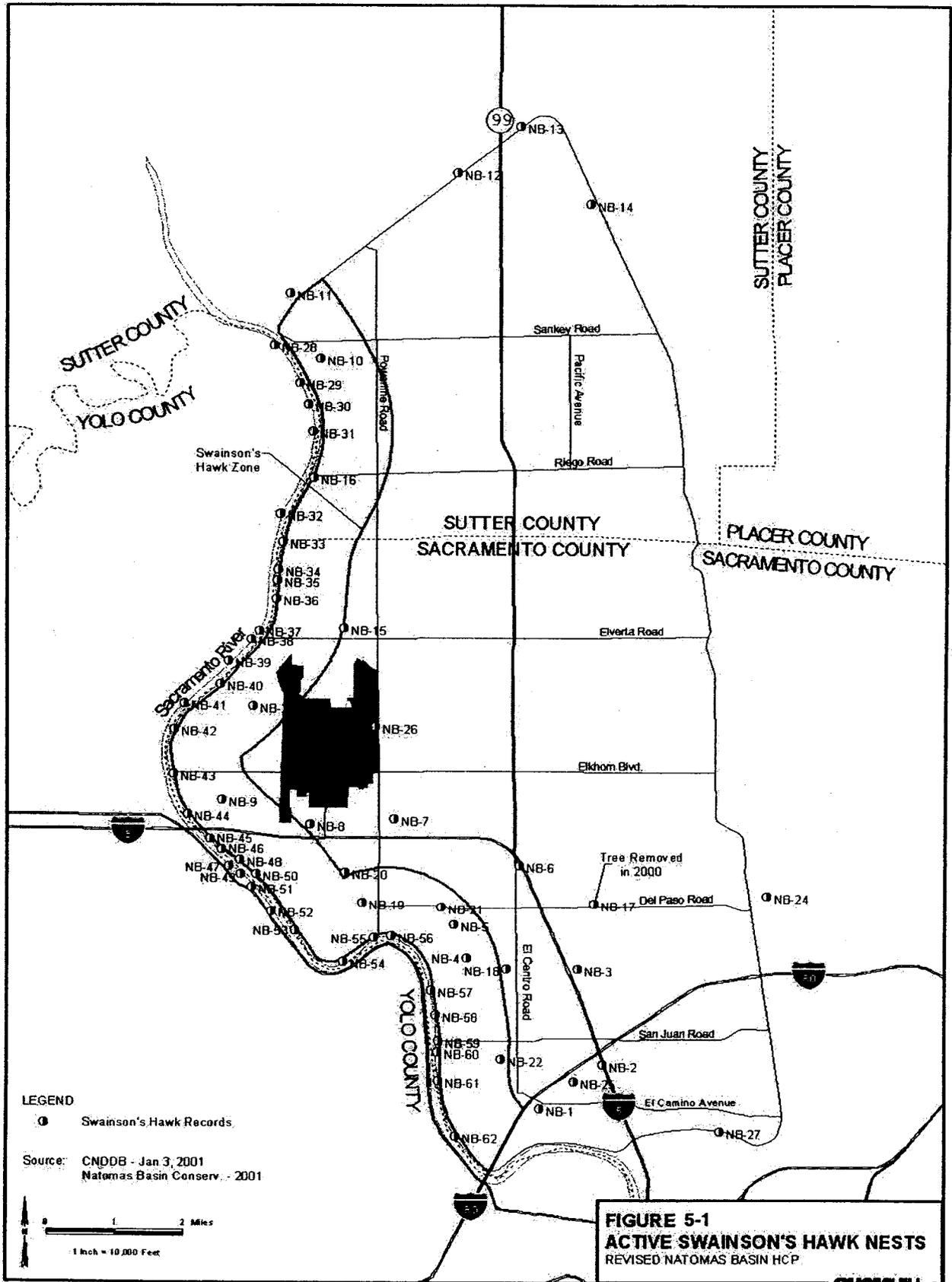


TABLE 5-5
Change in Potential Habitat for Swainson's Hawk (acres)

Habitat Class ^a	Baseline	City of Sacramento	Metro Air Park	Sutter County	Total Change	Future Condition
Nesting Habitat						
Riparian	124	(24)	0	0	(24)	100
Oak Groves	98	(6)	(2)	0	(8)	89
Tree Groves	106	(10)	(23)	0	(33)	73
Total Nesting	328	(40)	(25)	0	(65)	263
Foraging Habitat						
Alfalfa	371	0	0	0	0	371
Idle	1,464	(675)	(50)	(8)	(733)	731
Non-rice Crops	16,686	(4,663)	(325)	(1,529)	(6,517)	10,169
Grassland	886	(427)	0	(134)	(560)	325
Pasture	674	(23)	(22)	(101)	(147)	527
Ruderal	1,970	(1,137)	(6)	(88)	(1,231)	739
Total Foraging	22,051	(6,925)	(403)	(1,860)	(9,188)	12,862

(#) decrease in acreage

Source: Habitat and Land Use Assessment Database (CH2M HILL, 2002).

The land use analysis indicates that urban development could reduce potential nesting habitat by 65 acres. The change in the amount of nesting habitat, however, would be substantially less than this amount, and occupied nesting habitat could increase under the HCP. Loss of 8 acres of oak groves is attributable to three isolated groves in the Willow Creek area of the City of Sacramento and one 2-acre oak grove on the Metro Air Park property. The 24 acres of riparian lands are primarily located along the east side of Fisherman's Lake. This area is not designated as exempt from paying HCP fees, and therefore is included in the calculation of areas to be developed. This riparian habitat, however, would not be developed because of the open space buffer to be created in this area under the HCP. A small area of riparian habitat is also located near the northbound I-5 offramp to Del Paso Road. Loss of 33 acres of tree groves is primarily associated with a 21-acre grove in the Metro Air Park property. A 6-acre tree grove has been incorporated into the landscape features of the River View Oaks office complex, and a 1.5-acre tree grove will be preserved as part of the Whitter Ranch historic farm. Three remaining groves totaling approximately 4.5 acres are located as follows: one near the recently annexed City area near where I-80 crosses the Sacramento River, one west of I-5 near the proposed South Loop Road overpass, one in the City's proposed annexation area immediately south of Elkhorn Boulevard, and one in the Sutter County Industrial-Commercial Reserve north of Sankey Road. These four parcels were assumed to be lost to urban development.

None of the Riparian habitat, Oak Groves or Tree Groves that could be lost because of urban development contain Swainson's hawk nest sites. Thus, the projected habitat change would

not directly affect the existing Swainson's hawk population in the Natomas Basin. The HCP also includes measures to protect these and other existing habitat areas that could be used by Swainson's hawks for nesting in the future. The HCP requires:

- Avoiding removal of known nest trees if practicable
- Preserving valley oaks wherever possible
- Preserving and restoring riparian habitat, particularly at Fisherman's Lake (See Section V.5.b of the HCP)

These measures would contribute to maintaining existing nesting opportunities for Swainson's hawks.

The HCP also includes measures to increase nesting opportunities for Swainson's hawks over the 50 year project life. Specifically,

- Riparian trees would be planted on the Conservancy lands.
- Fifteen saplings would be planted for every Swainson's hawk nest tree impacted by development.
- The City would plant 60 sapling trees within 14 months of approval of the HCP.
- A tree planting program would be implemented to plant trees throughout the Basin (See Section V.5.b of the HCP).

It is estimated that four territories could be impacted by development in the City. To reduce the temporal effects associated with the potential loss of these territories, the City would advance funding to plant 60 sapling trees within 14 months of approval of the HCP; thus accelerating development of alternate nest sites to those expected to be impacted by development. The tree planting program and incorporation of riparian trees into the Conservancy's habitat reserves would be particularly beneficial because they could facilitate an increase in the number of territories. Portions of the Natomas Basin, particularly the east, support foraging habitat but provide few nesting opportunities. As a result, the available foraging habitat could be underused. The tree planting program and incorporation of riparian trees on the habitat reserves could create nesting opportunities in areas with limited nesting habitat but that have adequate foraging habitat and overall increase the nesting population of hawks in the basin.

In addition to these measures, the HCP recognizes the importance of nesting habitat along the Sacramento River and at Fisherman's Lake. Under the HCP, a goal of "no net loss" of nesting habitat would be established for the Swainson's hawk zone and no development in the Swainson's hawk zone would be permitted by under the HCP.⁵ Lands would be protected around Fisherman's Lake and RD 1000 would prepare a management plan for Fisherman's Lake to maintain and/or improve its habitat value for species covered by the HCP. This area supports four Swainson's hawks' nest sites (SHTAC, 2000). With these

⁵ The "Swainson's hawk zone" is defined as a corridor beginning at the Sacramento River levee, extending eastward for 1 mile, and running from the intersection of the Sacramento River and Natomas Cross Canal in the north of the Natomas Basin to the intersection of the Sacramento River and the American River in the south. For purposes of this assessment, the Swainson's hawk zone is considered to include those Swainson's hawk nest trees that are outside of but immediately adjacent to the Natomas Basin, along the Sacramento River.

measures, the known nesting sites territories associated with Fisherman's Lake would be protected and additional ones could be created with restoration of riparian habitat in this area. In combination, all of measures would act to avoid or minimize the loss of occupied and potential nesting habitat while providing additional nesting opportunities over the 50 year project life.

Potential foraging habitat for Swainson's hawk could be reduced by about 9,188 acres (a 42 percent reduction) in the Natomas Basin as a result of urban development. About 12,862 acres of potential foraging habitat would remain in the Natomas Basin. Loss of foraging habitat has the potential to indirectly impact Swainson's hawks. Under the HCP, 2,187.5 acres would be dedicated to upland habitat in permanent habitat reserves. This upland habitat could consist of existing foraging habitat for Swainson's hawk or could be created from lands that do not currently provide foraging opportunities for Swainson's hawks. If all of the upland habitat component of the habitat reserves consisted of protection of existing habitat, the net reduction in foraging habitat would be the 9,188 acres attributable to urban development. If all of the upland habitat component of the habitat reserves was created from non-habitat, then the net reduction in foraging habitat for Swainson's hawk would be about 7000.5 acres (a 32 percent reduction).

The importance of suitable foraging habitat to Swainson's hawk is influenced by its proximity to nest sites. Swainson's hawks have been found to forage up to 18 miles from nest sites, but most foraging occurs much closer to nest sites. Foraging habitat located closer to nest sites is considered to be more important than foraging habitat at greater distances. The CDFG considers habitat within 1.0 mile of the nest site as more valuable foraging habitat than habitat at greater distances. The acreage of foraging habitat for Swainson's hawk within 1 mile of nest sites is presented in Table 5-6. Of the 22,051 acres that provide potential foraging habitat for Swainson's hawk in the Natomas Basin, about 12,446 acres are within 1 mile of a known nest site.

TABLE 5-6
Change in Foraging Habitat Within 1 Mile of Swainson's Hawk Nest Sites (acres)

Habitat Class	Baseline	City of Sacramento	Metro Air Park	Sutter County	Total Change	Future Condition
Alfalfa	280	0	0	0	0	280
Grassland	51	(21)	0	0	(21)	30
Idle	619	(264)	(47)	0	(311)	308
Non-rice Crops	9,698	(2,523)	(232)	(159)	(2,915)	6,784
Pasture	353	(3)	(20)	0	(23)	330
Ruderal	1,444	(868)	(6)	(5)	(879)	565
Total	12,446	(3,679)	(305)	(165)	(4,149)	8,297

(#) decrease in acreage

Source: Habitat and Land Use Assessment Database (CH2M HILL, 2002).

Most of the nest sites in and immediately adjacent to the Natomas Basin are within the Swainson's Hawk Zone along the Sacramento River. In addition to these nest sites, the Natomas Cross Canal supports several nest sites. Based on the location of planned urban

development, conversion of potential foraging habitat to urban uses would generally occur at distances of greater than 1.0 mile from nest sites. Of the 12,446 acres of foraging habitat within 1 mile of a nest site, urban development is predicted to convert 4,149 acres of foraging habitat. More than half this acreage would consist of non-rice crops. With implementation of the HCP, 2,187.5 acres would be acquired and protected and upland habitat created or enhanced as foraging habitat for Swainson's hawk. If upland habitat for the reserves is created from areas that currently do not provide foraging habitat, up to 2,187.5 acres of additional foraging habitat could be created in the basin under the HCP. The Conservancy would set as a top priority the acquisition of upland reserve sites in the Swainson's hawk zone. Following approval of the HCP, Sutter County would initiate a general plan amendment process to redesignate the portion of the IRC in the Swainson's hawk zone as agriculture. This redesignation would provide additional assurance that foraging habitat would be maintained for Swainson's hawks.

The net reduction would be at least partially, if not entirely, offset by the greater quality of upland habitat in the habitat reserves. The predominant habitat that would be lost would be non-rice crops. Non-rice crops (e.g., row crops) are used less (Estep, 1989; Babcock, 1995) and considered poorer quality foraging habitat for Swainson's hawk than native grasslands, alfalfa, and pasture. Upland habitat in the reserves would be alfalfa or native grassland and would be managed specifically to provide foraging habitat for Swainson's hawk. Further, the upland habitat in the reserves would be available throughout the entire period of time that the hawks are in the basin and would be stable in amount and location over the long term. In agricultural fields, Swainson's hawks often concentrate foraging in agricultural fields during or immediately following harvest (Estep, 1989). When the fields are not being harvested, prey in agricultural habitats might not be accessible to Swainson's hawks such that the effective amount of habitat is less than indicated by the total acreage. Crop types also fluctuate in the Natomas Basin and could shift over time to crops that are less favorable to Swainson's hawks for foraging. The habitat reserves would provide certainty of the amount, quality and location of foraging habitat.

Within the habitat reserves, upland habitat would be managed specifically to produce prey for Swainson's hawks. In addition to the upland habitat in the reserves, Swainson's hawks could use portions of the managed marsh and at times rice fields. To provide overwintering habitat for giant garter snakes, managed marshes would include upland areas. These areas also would provide foraging opportunities for Swainson's hawks. Some of the managed marshes would be seasonal and would not be inundated during the late spring and summer. When not flooded, seasonal marshes could be used by Swainson's hawks if the marshes are colonized by small mammals. Similarly, rice fields could provide foraging opportunities for hawks for a couple months each year when they are dry. Under the HCP, 10 percent of the rice on the habitat reserves would be fallowed each year which would further provide potential foraging opportunities. Collectively, the habitat reserves effectively would provide greater of foraging opportunities than suggested by the upland component alone, although a the specific amount of foraging habitat available in any given year cannot be quantified.

Importantly, the Conservancy would monitor future proposed development in the Swainson's hawk zone, where the majority of known Swainson's hawk nest sites are located. Based on existing general plans, development in this zone is expected to be limited

over the term of the HCP. If urban development does occur, however, reserve lands established as mitigation for that development would, likewise, be located within the Swainson's hawk zone. In addition, the Conservancy would set as a top priority the acquisition of upland reserve sites in the Swainson's hawk zone (via easement or land purchase), irrespective of any specific development proposals in this area. These actions would help maintain foraging habitat in proximity to a majority of the nesting sites and mitigate losses in the amount of potential foraging habitat in the basin.

Effects of Construction Activities

Urban development and the construction of habitat reserves have the potential to displace and or disturb nesting Swainson's hawks. Nest disturbance from the operation of heavy construction equipment and continued presence of activity near nest sites could cause Swainson's hawks to abandon a nesting attempt or interfere with incubation and feeding of young in a way that reduces nesting success.

The HCP includes measures to avoid and minimize the potential for impacts to Swainson's hawks from construction associated with urban development and for the habitat reserves (Section V). These measures include:

- Pre-construction surveys to determine whether any Swainson's hawk nest sites occur on or within 1/2 mile of the lands designated for development.
- Timing restrictions for construction activity if an occupied Swainson's hawk nest is identified (i.e., defer construction activities until after the nesting season) and then, if unavoidable, the nest tree may be destroyed during the non-nesting season.
- An onsite biological monitor (CDFG-approved raptor biologist) would be assigned to the project if construction or other project-related activities that could cause nest abandonment or forced fledging are proposed within the 1/4 mile buffer zone.

In combination, these measures would help ensure that nest sites are identified prior to the start of construction and that actions are taken to minimize or avoid adverse effects to the birds during the nesting season.

Effects of O&M Activities

Water Agencies

O&M activities by RD 1000 and Natomas Mutual could affect Swainson's hawks during their breeding season. Isolated trees along the canal and ditch system support nesting by Swainson's hawks. Nesting birds could be affected by noise from maintenance equipment such as mowers and construction equipment used for sediment removal as well as human activity in the vicinity of an occupied nest. Swainson's hawks that nest in trees along irrigation canals and ditches have selected and used these trees coincident with the on-going activities. Swainson's hawks that nest in trees on irrigation canals and ditches have successfully fledged young (SFTAC, 2001). Thus, no adverse effects to Swainson's hawks are anticipated as a result of on-going O&M activities.

O&M activities by RD 1000 and Natomas Mutual also have the potential to indirectly affect Swainson's hawks through vegetation control and rodent control practices along the ditches and canals. Canal banks can provide foraging opportunities for Swainson's hawk. O&M

practices can influence the quality of canal banks as foraging opportunities for Swainson's hawk through effects on vegetation and directly through rodent control. Under the HCP, the water agencies would implement best management practices on maintain vegetative cover on the ditches and canals to provide food and protection for prey species (Section V). The water agencies also would limit rodent control measures to those necessary to maintain structurally sound flood control levees.

Natomas Basin Conservancy

The Conservancy would manage the habitat reserves to provide nesting and foraging habitat for Swainson's hawk. Thus, the Conservancy's operations and maintenance activities overall would have beneficial effects on Swainson's hawk. For example, under the HCP, the Conservancy would manage upland habitats on the reserves to support mice and insects to support a prey base for the hawks. If Swainson's hawks nest on the habitat reserves, O&M activities would have the potential to disturb nesting birds. Under the HCP the Conservancy would implement take avoidance measures to minimize potential take that could occur during habitat enhancement and management activities on reserve lands. the Conservancy would ensure that all such take avoidance measures as are necessary and appropriate are included in reserve management plans, as well as additional measures determined to be necessary during the development of management plans.

Overall Effects on Swainson's Hawk

Swainson's hawks once were one of the most common raptors in California. The breeding population in California has been estimated at about 10 percent of its historic level (Bloom, 1980). The substantial reduction in riparian forest and oak woodland habitat that Swainson's hawks use for nesting has been considered the primary cause of this species decline in California. Conversion of grassland to agricultural and urban also could have contributed to declines although, the hawks have adapted to using some types of agricultural fields for foraging. It is uncertain if the availability and quality of foraging habitat is currently a limiting factor for Swainson's hawk in the Natomas Basin.

Currently, there are 892 known Swainson's hawk nesting site occurrences in California. Three of these occurrences have been extirpated, and seven reported nest sites have not been relocated. Of the remaining 882 known occurrences presumed extant, 141 are reported in Sacramento County, and 53 are reported from Sutter County (CDFG, 2001). The most recent survey of the Natomas Basin (SHTAC, 2001) shows 35 nest sites along the Sacramento River (22 on the east side and 13 on the west side) and 27 nest sites located elsewhere in the basin, for a total of 62 nest sites in or immediately adjacent to the Natomas Basin. Two of the sites in the basin are considered abandoned.

Not including the two abandoned territories, seven of the known nest sites are within the approved development areas of the HCP. Five of these sites are located within the City and two are within Metro Air Park. Except for one of the sites, all were used in 2001. These seven nest sites have the greatest potential to be affected by covered activities, which could result in the direct loss of nesting habitat at these sites if removal of nest trees is not be avoided or the territories could be abandoned because of the indirect effects of reduced foraging habitat around the nest site. If the nest trees are retained, three of the territories in the City (NB-1, NB-2, and NB-25) would probably remain viable because of the large amount of foraging habitat available within about 0.25 mile between the City's western edge and the

Sacramento River. The remaining two territories in the City (NB-3 and NB-25) would be surrounded by urban development and would be 0.5 to 1.0 mile from alternative foraging habitat. These territories could be abandoned. There are territories in the Natomas Basin, however, that are surrounded by urban development and are more than one mile from suitable foraging habitat but that have successfully fledged young. Thus, these territories could remain occupied if the nest tree is retained. One of the territories in the Metro Air Park area is within about 0.25 mile of foraging habitat that would not be developed and therefore would not be expected to be lost because of reduced foraging habitat at Metro Air Park. The second nest site at Metro Air Park (NB-26) was a new site in 2001. Fallowing of rice fields in the Metro Air Park property in the last few years could have facilitated establishment of this territory. Little alternative foraging habitat is available near this nest site and it could be abandoned with development of Metro Air Park.

Overall, three territories are considered at risk to be abandoned. Although these sites have the greatest potential of those in the basin to be affected by urban development it is uncertain if they would be abandoned. Nevertheless, the HCP includes actions to offset a potential loss of territories, specifically the creation of additional nest sites at the habitat reserves, implementation of the tree planting program, and restoration of riparian habitat. A short-term reduction in the number of territories could occur prior to the development of alternate nest sites but over the long term the HCP would encourage the establishment of new territories as long as nesting habitat and not foraging habitat is the primary limiting factor.

Urban development could reduce the amount of foraging habitat available within the Natomas Basin as a whole. However, few territories likely would be abandoned a result of the projected reduction in foraging habitat acreage for the following reasons:

- Loss of potential foraging habitat would primarily occur away from nest sites where it is less valuable to nesting Swainson's hawks
- Maintenance of foraging habitat with the Swainson's hawk zone would be a focus of the HCP and most of the nest sites are located in this zone
- Upland reserves would be managed to provide better quality foraging habitat for Swainson's hawk than is provided in agricultural fields
- Foraging habitat is probably not currently limiting because of the large amount of agricultural fields available in and around the Natomas Basin and the ability for Swainson's hawks to forage over large distances

Lastly, upland reserve sites in the Swainson's hawk zone would be acquired with habitat contiguity as a primary consideration. The acquisitions by the Conservancy would ensure that substantial amounts of Swainson's hawk habitat would be maintained in close proximity to occupied nesting habitat. In addition acquisition would ensure that upland habitats would be selected using a strategy that maximizes the Conservancy's ability to maintain Swainson's hawks in the basin (i.e., upland habitats would not be randomly selected for the reserve system, either inside the zone or outside). For these reasons, the reduction in foraging habitat is not expected to result in the loss of territories associated with nest trees located outside of the areas proposed for development.

5.6 Aleutian Canada Goose (*Branta canadensis leucopareia*)

5.6.1 Species Description

The Aleutian Canada goose was delisted by the USFWS on March 20, 2001 (FR 66:15643), and is considered a federal Species of Concern because of ongoing monitoring activities pursuant to the delisting. The Aleutian Canada goose is a subspecies of the Canada goose, characterized by its smaller size and a distinctive white ring at the base of its black neck. The primary winter habitat for the goose's largest population segment is the Central Valley, and most of this population can be found by mid-December in the Modesto area (FR 66:15643). Foraging habitat consists of pasture, flooded rice fields, and harvested fields (USFWS, 1991). In addition, large ponds, flooded fields, and rice checks provide roosting habitat for the wintering geese (USFWS, 1991).

Currently, there are 13 known occurrences of wintering Aleutian Canada geese in California (CDFG, 2001). Of these 13 occurrences, 4 occur in Sutter County. These occurrences are all located in agricultural fields around the Sutter County/Colusa County line, north of the HCP area. There are no known occurrences in the HCP area. Aleutian Canada geese, however, likely stop in the Natomas Basin for brief periods during migration to and from their traditional wintering areas.

Additional information about the Aleutian Canada goose can be found in the HCP (Section II.C.4.a.), in the *Federal Register* notice that delists the species (FR 66:15643; March 20, 2001), and in the USFWS's Recovery Plan for the species (USFWS, 1991).

5.6.2 Environmental Effects

Effects of Changes in Habitat

Aleutian Canada geese do not breed or winter in the Natomas Basin, but could use habitats in the Natomas Basin as a migratory stopover while migrating between breeding grounds in Alaska and wintering grounds in the San Joaquin Valley. Pasture, rice fields, and other croplands in the Natomas Basin could be used by migrating geese for foraging or roosting. Currently, much of the Natomas Basin (40,053 acres) could be used by Aleutian Canada geese. The habitat classes (from Tables 4-3 and 4-4) that provide potential habitat for the Aleutian Canada goose and the changes in acreage from implementing the HCP are presented in Table 5-7. It is important to note that only a portion of the areas designated as "non-rice crops" constitute potential habitat for the Aleutian Canada goose. Only grain crops such as corn and wheat would likely be used by Aleutian Canada geese; non-grain crops such as tomatoes do not provide habitat. As such, the amount of habitat for Aleutian Canada geese is overestimated in Table 5-7.

TABLE 5-7
Change in Potential Habitat for Aleutian Canada Goose (acres)

Habitat Class ^a	Baseline	City of Sacramento	Metro Air Park	Sutter County	Total Change	Future Condition
Non-rice crops	16,686	(4,663)	(325)	(1,529)	(6,517)	10,169
Pasture	674	(23)	(22)	(101)	(147)	527

TABLE 5-7
Change in Potential Habitat for Aleutian Canada Goose (acres)

Habitat Class ^a	Baseline	City of Sacramento	Metro Air Park	Sutter County	Total Change	Future Condition
Rice (roosting and foraging)	22,693	(970)	(1,541)	(5,577)	(8,087)	14,606
Total	40,053	(5,656)	(1,888)	(7,207)	(14,751)	25,302

(#) decrease in acreage

Source: Habitat and Land Use Assessment Database (CH2M HILL, 2002).

Under the HCP, the total amount of potential habitat for the Aleutian Canada goose would be reduced by about 14,750 acres because of urban development. With urban development of 17,5000 acres, an estimated 25,302 acres of potential habitat for Aleutian Canada geese would remain in the Basin. The basin would continue to provide for use by migrating geese given this abundance of potential habitat.

This net reduction in potential habitat for the Aleutian Canada goose is unlikely to result in take of individual geese or affect the viability of the species. Potential habitat would remain abundant in the basin and agricultural areas are present and abundant both north and south of the basin. State and federal refuges also are distributed along the Central Valley and are managed to provide wintering and stopover habitat for ducks and geese. Further, the Aleutian Canada goose was listed as threatened because of threats on the species' breeding grounds in Alaska; the availability of migratory habitat has not been identified as a limiting factor for this species. Thus, projected changes in the amount of habitat in the Natomas Basin potentially used by Aleutian Canada geese would not be expected to affect the species' population. In the event that use of the Natomas Basin by Aleutian Canada geese increases in the future, the Conservancy would to use applicable Service-approved recovery or management plans to implement any additional conservation measures deemed appropriate.

The net loss of potential habitat would be at least partially offset by creation and protection of the habitat reserves. All of the habitats on the 8,750 acres in the reserve system would provide potential habitat for Aleutian Canada geese in perpetuity. The system of reserves would provide a mosaic of wetland, upland and agricultural habitats, all of which could be used by Aleutian Canada goose. The reserves would be protected in perpetuity, thereby providing certainty of the availability of stopover habitat for Aleutian Canada geese over the long-term. The stability and quality of habitat provided by the proposed system of permanent reserves would help ensure that Aleutian Canada geese could continue to use the Natomas Basin as a stopover area on their migration.

Effects of Construction Activities

Construction activities associated with urban development or creation of habitat would not be expected to adversely affect Aleutian Canada geese. Potential effects would be limited to displacement of birds foraging or roosting on a field during the initial phases of construction when fields are graded. Aleutian Canada geese only occur in the basin for brief periods during migration and in small numbers during migration such that the potential for construction activities to coincide with the presence of Aleutian Canada geese is minimal.

Effects of O&M Activities

Water Agencies

O&M activities by RD 1000 and Natomas Mutual are unlikely to affect the Aleutian Canada goose. These activities would be focused on canals and drains, which do not provide suitable habitat for this species. Further, the Natomas Basin is of limited importance to the Aleutian Canada goose, and the species is highly mobile during potential stopover periods in the Natomas Basin.

Natomas Basin Conservancy

Ongoing maintenance of the habitat reserves would be unlikely to affect the Aleutian Canada goose. Potential effects would be limited to displacement of birds foraging or roosting on a field. Potential disturbance would be of limited scope and short duration. Also, Aleutian Canada geese only occur in the basin for brief periods during migration and in small numbers during migration such that the Conservancy could schedule O&M activities to avoid disturbance. If hunting is allowed on the reserves, CDFG requirements would be followed. Hunting would not be allowed if it conflicted with the species' ongoing recovery.

Overall Effects on Aleutian Canada Goose

Aleutian Canada geese use the Natomas Basin to a limited degree during their seasonal migrations. Potential habitat is expected to remain abundant under the HCP. This species is not believed to be limited by wintering habitat such that the reduction in the potential in the Natomas Basin would not be expected to have any effects on the population. The habitat reserves under the HCP would provide high-quality habitat that is stable in amount and location in perpetuity. The long-term availability of this habitat could be beneficial to the Aleutian Canada goose if future development in the Central Valley substantially reduces other wintering and migratory habitat.

5.7 Burrowing Owl (*Athene cunicularia*)

5.7.1 Species Description

Burrowing owls are considered a Species of Concern by the USFWS, and a Species of Special Concern by CDFG. Burrowing owls are small, long-legged birds of open terrain that use vacated animal burrows (e.g. ground squirrel burrows) or artificial structures (e.g., culverts) for nesting and shelter. Generally, foraging habitat consists primarily of open grasslands and grass/shrub lands where prey species (e.g., insects and small mammals) are readily available. The species is often found in roadsides and other disturbed areas inhabited by ground squirrels and with few visual obstructions. Little scientific information is available for the local burrowing owl population (e.g. home range information and wintering versus resident status), but suitable habitat in the Natomas Basin likely consists of areas with small mammal burrows and nearby foraging areas.

Burrowing owls are neotropical migrants that occur throughout the western United States, including portions of northern Mexico and southern Canada. The species is also locally distributed throughout suitable habitat in the Caribbean, and in Central and South America (Haug, et al., 1993). California appears to have a non-migratory population (primarily in the

Imperial Valley), and is also a wintering ground for burrowing owls from other regions. Burrowing owls in Northern California are probably migratory, but little information is known about the migration habitats of the Northern California population (Haug, et al., 1993). The burrowing owl population is known to be in decline throughout its range because of various factors including habitat destruction (e.g., agricultural practices and land development), vehicle collisions, and predation. In California, and in the Natomas Basin specifically, urbanization is likely a key threat to this species.

There are 370 known burrowing owl occurrences in California (CDFG, 2001). Three hundred of these occurrences are considered extant. Eighteen occurrences are known in Sacramento County, of which 17 are considered extant. Three occurrences are recorded in the Natomas Basin, with another three known burrowing owl sites on the Conservancy's Betts-Kismat-Silva property. One occurrence is known in Sutter County. This occurrence is also considered extant (CDFG, 2001).

Burrowing owls are a permanent resident in California, but additional wintering owls also occur in the state. Burrowing owls occur in low numbers in the HCP area, but no systematic surveys have been conducted in the Plan area. One burrowing owl was observed near a burrow on the Metro Air Park project site in March 2000. The owl was observed along Powerline Road between Elverta Road and Elkhorn Boulevard on a canal bank (Thomas Reid Associates, 2000). Burrowing owls also occur at the Sacramento International Airport. During HCP habitat mapping surveys, three pairs of burrowing owls were observed along a water conveyance canal in the eastern portion of the Plan area. Burrowing owls also have been observed northeast of the intersection of San Juan and El Centro Roads and west of East Levee Road on the south side of Elkhorn Boulevard (CDFG, 2001).

5.7.2 Environmental Effects

Effects of Changes in Habitat

Burrowing owls are associated with open grassland habitats. They are dependent on burrowing mammals particularly ground squirrels to excavate burrows and thus, their occurrence and distribution is linked to these mammals. In the Natomas Basin, grasslands and pastures provide nesting and foraging habitat for burrowing owl. Burrowing owls also could forage in alfalfa but nesting would not be expected because of routine disturbance caused by harvesting. Burrowing mammals often create burrows in road and canal embankments and burrowing owls can be found nesting in these areas. For this analysis, grassland, pasture and alfalfa are considered habitat for burrowing owl. Based on this definition, the Natomas Basin supports about 1,931 acres of potential habitat for burrowing owl. The habitat classes (from Tables 4-3 and 4-4) that provide potential habitat for burrowing owl and the changes in acreage from implementing the HCP are presented in Table 5-8.

TABLE 5-8
Change in Potential Habitat for Burrowing Owl (acres)

Habitat Class ^a	Baseline	City of Sacramento	Metro Air Park	Sutter County	Total Change	Future Condition
Alfalfa	371	0	0	0	0	371
Grassland	886	(427)	0	(134)	(560)	325
Pasture	674	(23)	(22)	(101)	(147)	527
Total	1,931	(450)	(22)	(235)	(707)	1,223

(#) decrease in acreage

Source: Habitat and Land Use Assessment Database (CH2M HILL, 2002).

Under the HCP, urban development would impact about 700 acres of potential habitat for burrowing owl. Most of the habitat that would be lost would be grassland and pasture in the northern portion of the City's "panhandle" annexation area and the northeastern portion of Sutter County's Industrial-Commercial Reserve. This habitat loss would be offset by the upland mitigation strategy.

The upland mitigation strategy of the HCP is to create and maintain optimum nesting and foraging habitat for Swainson's hawk. Upland foraging habitat for Swainson's hawk includes open grassland and pasture areas and field crops (e.g., alfalfa) that are also suitable habitat for burrowing owl. Thus, the 2,187.5 acres of upland habitat in the reserves would be suitable for both burrowing owl and Swainson's hawk. Uplands associated with the wetland reserves could provide additional habitat.

In addition to increasing the total amount of habitat for burrowing owls, habitat in the reserve system would provide better habitat conditions for burrowing owl than the habitat that would be lost. The HCP requires specific management requirements for burrowing owls on the proposed system of upland reserves. Key requirements include creating mounded areas suitable for burrowing owl nesting, enhancing prey populations, and avoiding disturbance during management activities.

In addition to reducing habitat availability, urban development in areas adjacent to burrowing owl colonies can indirectly impact this species. Free-ranging domestic cats are often introduced to an area by the establishment of residential areas. Residential development close to burrowing owl colonies could increase predation by cats. Nearby residential areas could also lead to harassment of owls by human. In a Florida study area, harassment of owls by children was a leading cause of nest failures by burrowing owls (Millsap and Bear 2000). Under the HCP, habitat reserves would be located at least 800 feet from urban areas and areas designated for urban development in applicable plan (unless a smaller distance is approved by CDFG and USFWS on a case-by-case basis) and human access would be controlled. With these provisions, predation by cats and harassment by human would be reduced although not necessarily eliminated.

Effects of Construction Activities

Burrowing owls could be directly affected by construction activities associated with urban development and habitat creation on the habitat reserves. Earth-moving activities can trap

or injure owls in their burrows. The HCP requires the following measures to avoid impacts to burrowing owls:

- Pre-construction surveys would be conducted prior to the initiation of grading or earth disturbing activities site to determine if any burrowing owls are using the site for foraging or nesting. If nest sites are found, the CDFG shall be contacted regarding suitable mitigation measures, which may include a 300 foot buffer from the nest site during the breeding season (March 15 - August 31), or a relocation effort for the burrowing owls. Results of the pre-construction survey would be submitted to the land use agency with jurisdiction over the site prior to commencement of construction activities.
- If future surveys reveal the presence of burrowing owls on the project site, the applicant/developer would prepare a plan for relocating the owls to a suitable site.

By following these measures, the potential for injury of or trapping owls in their burrows would be reduced. These measures also require relocation of owls and habitat protection if a colony is displaced by construction. With this requirement, there would be no net change in the number of colonies as a result of urban development.

On the habitat reserves, habitat creation would be designed and conducted so as to avoid impacts to burrowing owl colonies. For example, the habitat creation plan for the Betts-Kismat-Silva property maintains the existing burrowing owl colonies intact. If future land acquisitions support burrowing owl colonies, they would be similarly protected.

Effects of O&M Activities

Water Agencies

O&M activities conducted by RD 1000 and Natomas Mutual have the potential to affect burrowing owls directly and indirectly. Activities such as sediment removal have the potential to trap owls in their burrows. Because burrowing owls do not inhabit canal and ditch embankments to a large degree, however, impacts to the burrowing owl population are expected to be infrequent and to affect a small number of owls. Rodent control activities have the potential to indirectly affect burrowing owls. Burrowing owls are dependent on burrowing rodents to create burrows. Under the HCP, the water agencies would only conduct rodent control activities as necessary to maintain structurally sound flood control levees. While not avoiding this potential impact entirely, this measure would reduce the potential impacts of these activities on populations of burrowing mammals on which the burrowing owl depends.

Natomas Basin Conservancy

The Conservancy would avoid impacts to burrowing owls during management activities of the habitat reserves by following CDFG's Staff Report on Burrowing Owl Mitigation.

Overall Effects on Burrowing Owl

With the increased amount and quality of habitat for burrowing owls and long-term protection of habitat in the reserve system, the HCP would improve habitat conditions for burrowing owl in the Natomas Basin. Reserve acquisitions to date have included known burrowing owl populations (i.e., Betts-Kismat-Silva), and it is likely that burrowing owls would occur on future reserve lands such that the number of colonies in areas permanently protected would increase. The overall combination of the measures (i.e., pre-construction

surveys for covered species and their habitat); species-specific measures (e.g., avoidance of burrow sites during the breeding season both within development lands and reserve lands, species relocation); additional mitigation according to CDFG guidelines; and long-term protection, creation, and enhancement of upland habitat in the reserve system would be expected to at least maintain the existing population level of burrowing owl in the Natomas Basin and potentially increase it over time.

5.8 Bank Swallow (*Riparia riparia*)

5.8.1 Species Description

The bank swallow is state listed as a Threatened species under the California Endangered Species Act. Historically, bank swallows nested on coastal bluffs in southern California and riverbanks throughout the Central Valley and northern California; however, the state's nesting population of bank swallow is currently concentrated on the banks of Central Valley streams. Approximately 75 percent of the current breeding population occurs along banks of the Sacramento and Feather Rivers. Other colonies persist along the central coast from Monterey to San Mateo counties, and northeastern California in Shasta, Siskiyou, Lassen, Plumas, and Modoc counties (Remson, 1978). There are no known breeding colonies remaining in southern California.

The bank swallow occurs in California during the breeding season (May through July) and winters in South America. Bank swallows begin arriving in the Central Valley from wintering grounds in South America in early March to breed and raise their young. Numbers decline in July and August as nesting colonies are abandoned and migration begins. Colonies are vacant by early August and some migrants could be observed through early- to mid-September. Bank swallows are rarely seen in California during the winter.

The bank swallow breeds from early May through July. Pairs usually nest colonially in groups of 10 to 1,500 although most colonies have 100-200 nesting pairs. Bank swallows require vertical banks or cliffs with fine-textured or sandy soils near streams, rivers, ponds, lakes, or the ocean for nesting. Bank swallows forage by hawking insects during long, gliding flights. Foraging occurs primarily over open riparian areas, but also over grassland, shrubland, and savannah habitats during the breeding season. Bank swallows feed on a wide variety of aerial and terrestrial soft-bodied insects including flies, bees, and beetles. The bank swallow uses holes dug in cliffs and river banks for cover; logs, shoreline vegetation, and telephone wires are also used for roosting.

There are 171 known bank swallow occurrences in California (CDFG, 2001). One of these occurrences is extirpated. There are 35 bank swallow occurrences (all presumed extant) in Sutter County and seven occurrences in Sacramento County (all presumed extant). Although there is no suitable nesting habitat in the Natomas Basin, bank swallows from nearby nesting colonies have the potential to forage in the Natomas Basin, and foraging could also occur during migration to nesting sites north of the Natomas Basin.

This species is a colonial nester and nests primarily in riparian and other lowland habitats west of the desert. This species requires vertical banks/cliffs with fine-textured/sandy soils to dig a nesting hole near streams, rivers, lakes, and oceans. Breeding occurs from about sea

level to as high as 6,900 feet (Small, 1994). Bank swallows tend to return to these colonial nests year after year.

5.8.2 Environmental Effects

Effects of Changes in Habitat

Bank swallows nest in vertical riverbanks with friable soils. Waterways within the Natomas Basin are largely channelized canals and ditches that are designed to resist erosion and therefore do not support suitable nesting substrates for bank swallows. Bank swallows do not nest in the Natomas Basin and the expected changes in land use do not include the removal or creation of bank swallow nesting habitat.

Bank swallows prey on insects and can forage in variety of open habitats. However, typically they concentrate foraging in riparian areas, wetlands and open water habitats (e.g., canals, ponds, and seasonally wet areas) where insects tend to be abundant.

Grasslands and other croplands also could be used. There are no bank swallow nesting colonies in the Natomas Basin but bank swallows from colonies outside of the Natomas Basin or migrating birds could forage in the basin.

Bank swallows could forage in almost any open habitat in the Natomas Basin. The habitat classes (from Tables 4-3 and 4-4) that provide potential habitat for bank swallow and the changes in acreage from implementing the HCP are presented in Table 5-9. As summarized in Table 5-9, open habitats where bank swallows could forage would decline by about 15,760 acres under the HCP. This reduction in potential foraging habitat would not be expected to adversely affect bank swallows for several reasons. First, the abundance and distribution of bank swallows are determined by the availability and location of suitable nesting substrates rather than the availability of foraging habitat. Second, potential foraging habitat would remain abundant (about 27,547 acres) and, given the low level of use of the Natomas Basin by bank swallows, the habitat remaining in the basin with full implementation of the HCP would be sufficient to support the existing level of use. Also, bank swallows foraging in the Natomas Basin most likely come from nesting colonies on the Sacramento River and probably forage close to the river. The urban development contemplated under the HCP would occur away from Sacramento River and would not affect the areas likely receiving greatest use by bank swallows.

TABLE 5-9
Change in Potential Habitat for Bank Swallow (acres)

Habitat Class ^a	Baseline	City of Sacramento	Metro Air Park	Sutter County	Total Change	Future Condition
Alfalfa	371	0	0	0	0	371
Grassland	886	(427)	0	(134)	(560)	325
Non-rice crops	16,686	(4,663)	(325)	(1,529)	(6,517)	10,169
Pasture	674	(23)	(22)	(101)	(147)	527
Ponds and seasonally wet areas	96	(7)	(4)	(10)	(21)	75
Rice	22,693	(970)	(1,541)	(5,577)	(8,087)	14,606
Riparian	124	(24)	0	0	(24)	100

TABLE 5-9
Change in Potential Habitat for Bank Swallow (acres)

Habitat Class ^a	Baseline	City of Sacramento	Metro Air Park	Sutter County	Total Change	Future Condition
Canals (all)	1,778	(117)	(72)	(215)	(404)	1,374
Total	43,308	(6,231)	(1,964)	(7,566)	(15,760)	27,547

(#) decrease in acreage

Source: Habitat and Land Use Assessment Database (CH2M HILL, 2002).

To the extent that bank swallows use the Basin, the system of habitat reserves would be managed to provide a marsh ecosystem which would support a greater abundance and diversity of insects than agricultural fields. The creation of reserves could improve foraging opportunities for bank swallows. The habitat reserves also would be protected in perpetuity and provide habitat that is stable in quality and location. The Conservancy would manage the habitat reserves in accordance with applicable USFWS- or CDFG-approved bank swallow recovery or management plans. The HCP also contains management provisions to implement any additional conservation measures deemed appropriate if use of the Natomas Basin by this species increase in the future.

Effects of Construction Activities

No bank swallow nesting colonies are currently recorded in the Natomas Basin and such colonies are unlikely to occur because suitable nesting habitat (i.e., vertical banks with fine-textured soils) is absent. Accordingly, construction-related impacts are unlikely to occur. The HCP requires that surveys be conducted prior to the approval of urban development permit. In the event that a bank swallow nesting colony is found in a development area, impacts would be avoided during the nesting season. Similarly, in creating habitat on the habitat reserves, the Conservancy would avoid impacts during the nesting season if a nesting colony occurs on the habitat reserves.

Effects of O&M Activities

Water Agencies

O&M activities by RD 1000 and Natomas Mutual are unlikely to affect the bank swallow. These activities would be focused on canals and drains, which do not provide suitable nesting habitat for this species. O&M activities would not preclude or interfere with foraging by bank swallows.

Natomas Basin Conservancy

O&M activities by the Conservancy are unlikely to affect the bank swallows because suitable nesting habitat is not expected to occur on reserve lands. In the event that a bank swallow colony does occur on the habitat reserves, the Conservancy would avoid disturbance of colonies during the nesting season. Operation and maintenance activities would not preclude or interfere with foraging by bank swallows. If use of the Natomas Basin by bank swallows appreciably increased in the future, the Conservancy would implement additional conservation measures deemed appropriate based on applicable Service or CDFG approved bank swallow recovery or management plans, and/or the Adaptive Management provisions of the HCP.

Overall Effects on Bank Swallow

Bank swallows nest exclusively in high, steep, vertical banks typically formed on larger rivers through erosive processes. The primary contributor to this species' decline in California has probably been bank protection and flood control actions as well as flow diversions and regulations that have reduced erosive processes on Central Valley rivers. Because suitable nesting substrates do not occur in the Natomas Basin, the HCP would not affect (either positively or negatively) the species' primary limiting factor. As such, the HCP is not likely to affect this species.

5.9 Loggerhead Shrike (*Lanius ludovicianus*)

5.9.1 Species Description

The loggerhead shrike is a state Species of Special Concern. The loggerhead shrike occurs from the southern Canadian provinces south across most of the United States and into Mexico (American Ornithologists Union, 1957). The shrike is a resident species throughout the lowlands and foothills of California (Grinnell and Miller, 1944). The loggerhead shrike occurs in grasslands, agricultural lands, open shrublands, and woodlands (Bent, 1950). It prefers areas with perch sites (Zeiner et al., 1990). A study conducted in Illinois reported that shrikes were most abundant near pastures, hedgerows, cornfields, and rural residential areas (Smith and Kruse, 1992). Shrikes nest in low trees, dense shrubs, and vines. They feed on insects, small reptiles, and small mammals (e.g., mice). This species frequently skewers prey on thorns, sharp twigs, barbed wire, or forces it into a crotch to feed on or to cache for storage (Zeiner et al., 1990).

The loggerhead shrike is common throughout most of lowland California. This species is observed regularly throughout Natomas Basin (Thomas Reid Associates, 2000). Suitable nesting and foraging habitat is common throughout the Basin. Several shrikes were observed on or near the Metro Air Park project site during a site reconnaissance conducted on March 23, 2000 (Thomas Reid Associates, 2000), and three shrikes were observed along the eastern portion of the Natomas Basin during habitat mapping surveys of the Basin in 2001.

5.9.2 Environmental Effects

Effects of Changes in Habitat

In the Natomas Basin, potential foraging habitat for the loggerhead shrike primarily consists of pasture, grasslands, ponds and seasonally wet areas, croplands, orchards, and ruderal habitats. Shrikes also could nest in trees or shrubs occurring in or along the margins of these habitats. Canals, riparian areas and oak and tree groves also provide nesting opportunities for this species. The habitat classes (from Tables 4-3 and 4-4) that would provide potential habitat for loggerhead shrike and the changes in acreage from implementing the HCP are presented in Table 5-10. Based on the GIS, the Natomas Basin supports about 23,300 acres of potential habitat for loggerhead shrike (Table 5-10).

Only a portion of the potential habitat would be used by loggerhead shrikes. This species occurs in close association with small trees and shrubs which it uses as perch sites from which foraging bouts are launched and as nest sites. Small trees and shrubs are not found in

the middle of the field; rather they occur sporadically along the margins of the fields. Telephone lines along the roads also are used. Because loggerhead shrikes forage by making short forays from perch sites, they would not use the inner portions of fields that occur at some distance from perch sites. Thus, loggerhead shrikes predominantly use the margins of fields and only areas where there are perch sites. Considering the entire acreage of agricultural fields as potential habitat for loggerhead shrike overestimates the amount of habitat available to this species in the Natomas Basin.

TABLE 5-10
Change in Potential Habitat for Loggerhead Shrike (acres)

Habitat Class ^a	Baseline	City of Sacramento	Metro Air Park	Sutter County	Total Change	Future Condition
Alfalfa	371	0	0	0	0	371
Grassland	886	(427)	0	(134)	(560)	325
Non-rice crops	16,686	(4,663)	(325)	(1,529)	(6,517)	10,169
Oak Groves	98	(6)	(2)	0	(8)	89
Orchard	182	(13)	0	0	(13)	169
Pasture	674	(23)	(22)	(101)	(147)	527
Ponds and seasonally wet areas	96	(7)	(4)	(10)	(21)	75
Riparian	124	(24)	0	0	(24)	100
Ruderal	1,970	(1,137)	(6)	(88)	(1,231)	739
Rural Residential	377	(46)	(10)	0	(56)	321
Tree Groves	106	(10)	(23)	0	(33)	73
Canals (all)	1,778	(117)	(72)	(215)	(404)	1,374
Total	23,348	(6,473)	(464)	(2,077)	(9,014)	14,332

(#) decrease in acreage

Source: Habitat and Land Use Assessment Database (CH2M HILL, 2002).

Based on the GIS, potential habitat for loggerhead shrike would decline by about 9,000 acres under the HCP because of urban development (Table 5-10). Most of the potential habitat that would be lost would be non-rice crops. Non-rice crops probably provide relatively poor habitat for loggerhead shrike because this species feeds predominantly on insects and intensive management of agricultural lands strives to reduce insect pests. Further, insecticides are used to control insect pests and insecticide use is believed to be contributing to declines in loggerhead shrike populations (Kaufman, 1996).

The habitat reserves would provide 2,187.5 acres of high quality habitat for loggerhead shrike in perpetuity. This habitat would be stable in quality and location and encourage the establishment and long-term persistence of a breeding population in the Natomas Basin. Specifically to attract and maintain loggerhead shrikes, the Conservancy would encourage development and maintenance of perching and nesting sites on habitat reserves. Riparian habitat and some of the managed marsh on the reserves could provide additional nesting opportunities and foraging perch sites. The mosaic of upland, riparian and marsh habitats

on the reserves would provide nesting opportunities in close proximity to foraging habitat and provide all essential habitat features for loggerhead shrikes.

In addition to reducing habitat availability, urban development near areas inhabited by shrikes can have indirect effects. Free-ranging domestic cats are often introduced to an area by the establishment of residential areas. Residential development close to areas inhabited by shrikes could lead to increased predation by cats. Under the HCP, habitat reserves would be located at least 800 feet from urban areas and areas designated for urban development in applicable plan (unless a smaller distance is approved by CDFG and USFWS on a case-by-case basis). By locating habitat reserves away from urban areas, predation by cats could be reduced although not eliminated.

Effects of Construction Activities

Construction activities associated with development or for habitat creation on the habitat reserves could disturb or displace loggerhead shrikes. Under the HCP, preconstruction surveys for loggerhead shrikes would be conducted prior to urban development. If loggerhead shrikes are found, disturbance would be avoided during the nesting season to the maximum extent possible. Construction activities adjacent to the habitat reserves could disturb shrikes nesting on the reserves. The potential for this impact is low because the habitat reserves would be located 800 feet from urban development or lands designated for urban development (unless a smaller distance is approved by CDFG and USFWS on a case-by-case basis). On the habitat reserves, the Conservancy similarly would avoid disturbance to loggerhead shrike nest sites during construction activities for habitat creation.

Effects of O&M Activities

Water Agencies

O&M effects on loggerhead shrike are expected to be rare or infrequent. Canals and drains that would be affected by O&M activities generally do not support suitable habitat for loggerhead shrike such that they are unlikely to occur in areas where O&M activities are conducted.

Natomas Basin Conservancy

On the habitat reserves, management activities by the Conservancy could disturb or displace loggerhead shrikes nesting on the reserve. Under the HCP, the Conservancy would avoid disturbance of loggerhead shrikes during the nesting season while conducting management activities to the maximum extent practicable.

Overall Effects on Loggerhead Shrike

The net reduction in agricultural fields under the HCP likely would reduce the total population of loggerhead shrikes in the Natomas Basin. With creation and protection of high quality habitat on the habitat reserves, loggerhead shrikes probably would continue to be supported in the basin albeit probably at a reduced population level than currently exists. The current size and distribution of the loggerhead shrike population in the Natomas Basin is uncertain as are the factors determining these population characteristics. Specific habitat requirements also have not been identified for loggerhead shrikes in the Central Valley. In the absence of this information, the ability of the habitat reserves to adequately mitigate the impacts of urban development is uncertain.

5.10 Valley Elderberry Longhorn Beetle (*Desmocerus californicus dimorphus*)

5.10.1 Species Description

The Valley elderberry longhorn beetle (VELB) is listed as Threatened under the federal Endangered Species Act. The valley elderberry longhorn beetle is a distinctive black and red-orange beetle with long antennae. The USFWS's Conservation Guidelines for the Valley Elderberry Longhorn Beetle (USFWS, 1999b) describes its habitat needs as follows:

The valley elderberry longhorn beetle is completely dependent on its host plant, elderberry (*Sambucus* species), which is a common component of the remaining riparian forests and adjacent upland habitats in the Central Valley. Use of the elderberry by the beetle, a wood borer, is rarely apparent. Frequently, the only evidence of the elderberry's use by the beetle is an exit hole created by the larva just prior to the pupal stage. The life cycle takes one or two years to complete. The animal spends most of its life in the larval stage, living within the stems of an elderberry plant. Adult emergence is from late March through June, about the same time as an elderberry produces flowers. The adult stage is short-lived.

The USFWS designated critical habitat for the VELB (50 CFR 17:95). Critical habitat is located along the American River Parkway in two places, upstream of the S.R. 160 overcrossing and in the Goethe Park area. In addition, the Recovery Plan designates the area along the American River east of Nimbus Dam as essential habitat, as well as an area along Putah Creek in Solano County (USFWS, 1984).

Information on the historical distribution and abundance of VELB is scarce. The substantial reduction in Central Valley riparian vegetation in the last 150 years suggests that the beetle's range has contracted and that remaining populations are discontinuous (USFWS, 1984). The USFWS's Programmatic Formal Consultation Permitting Projects with Relatively Small Effects on the Valley Elderberry Longhorn Beetle within the Jurisdiction of the Sacramento Field Office, California (USFWS, 1996) describes population densities of the beetle as follows:

Population densities of the beetle are probably naturally low (USFWS, 1984); and it has been suggested, based on the spatial distribution of occupied shrubs (Barr, 1991), that the beetle is a poor disperser. Low density and limited dispersal capability may cause the beetle to be vulnerable to the negative effects of the isolation of small subpopulations due to habitat fragmentation.

The California Natural Diversity Database lists 168 occurrences of the valley elderberry longhorn beetle in California; none is located in the Natomas Basin (CDFG, 2001). Sutter County supports seven of these occurrences and Sacramento County supports 20 of these occurrences. There are several NDDDB occurrences of VELB along the Sacramento River on the western and southern edge of the Natomas Basin. The occurrences nearest the Plan area are located southeast of Knights Landing, in Yolo County between Road 116 A and Road 16. Other Sutter County VELB occurrences are spread throughout the county often associated with major rivers and waterways. In Sacramento County, critical habitat is located along the

American River Parkway in two places, upstream of the S.R. 160 overcrossing and in the Goethe Park area.

There are no known occurrences of VELB in the Plan area (CDFG, 2001). There is suitable VELB habitat (i.e., elderberry shrubs) along the western and southern borders of the HCP area (i.e., in riparian areas associated with the Sacramento and American Rivers). Small patches of suitable habitat also exist along the East Drainage Canal, West Drainage Canal, and Main Drainage Canal (City of Sacramento Department of Utilities and Jones & Stokes Associates, 1996). Isolated elderberry shrubs or patches of shrubs also occur in several oak groves and old farm residences.

Although the historical abundance of VELB is unknown, extensive loss of riparian habitat, and to a lesser extent upland habitats, in the Central Valley during the past 150 years has reduced the amount of habitat available to the species and likely decreased and fragmented the species' range (USFWS, 1984). Loss of riparian habitat is attributable to flood control projects (e.g., levee construction, stream and river channelization, placement of rip-rap), land reclamation, and urban development. Additional factors affecting the VELB include grazing practices, herbicide spraying, and predation by non-native species.

Additional information about the VELB can be found in the HCP (Section II.C.4.a.), in the Federal Register notice (45:52803; August 8, 1980) that lists the species as Threatened under the ESA (USFWS, 1980), and in the USFWS's Recovery Plan for the species (USFWS, 1984).

5.10.2 Environmental Effects

Effects of Changes in Habitat

Riparian habitat is most likely to support elderberry shrubs on which the VELB depends, although elderberry shrubs could be found in almost all of the land use categories in the Natomas Basin. As explained previously, no loss of riparian habitat would occur as a result of the HCP. However, individual or small groups of shrubs could occur in areas subject to urban development and could be removed.

Although urban development could result in the removal of some elderberry shrubs, habitat availability for VELB would not be expected to decline in the Natomas Basin for several reasons. First, if elderberry shrubs occurred in a development area, the shrubs would be transplanted and additional seedlings planted in accordance with the USFWS Conservation Guidelines for Valley Elderberry Longhorn Beetle. As the seedlings developed, habitat for VELB would increase. Second, the riparian corridor along Fisherman's Lake which supports elderberry shrubs is expected to remain intact because of the lands to be protected adjacent to the lake under the HCP. Third, the General Plan Amendment proposed for the 1 mile buffer area in Sutter County along the Sacramento River would protect some riparian habitat potentially containing elderberry shrubs. Last, elderberry shrubs would be planted in the habitat reserves. Accordingly, overall habitat availability in the Natomas Basin would increase for the VELB and much of the habitat would be in areas protected in perpetuity.

Effects of Construction Activities

Although overall habitat availability for the VELB would improve, removal of individual elderberry shrubs (resulting in potential elderberry beetle mortality) could still occur.

Shrubs could be removed during construction associated with urban development or with habitat creation on the reserves. The practice of avoiding and/or mitigating impacts to elderberry shrubs in accordance with the Conservation Guidelines is common in the Central Valley, and would continue to be the required practice with implementation of the HCP. Potential impacts to the valley elderberry longhorn beetle during land development (i.e., City, Sutter County, Metro Air Park) are addressed in the HCP by requiring compliance with the USFWS's Conservation Guidelines for the Valley Elderberry Longhorn Beetle (USFWS, 1999b). Key aspects of the Conservation Guidelines include:

- Surveys for the beetles and elderberry host plants by a qualified biologist prior to construction.
- Avoidance of elderberry bushes with a 100-foot construction buffer area (may be reduced with the approval of the USFWS).
- Mitigation of elderberry bushes where avoidance is not possible. The preferred mitigation is to transplant mature elderberry bushes during their dormant season (when the beetles are in their larval stage in the interior or the plant) to permanent mitigation lands and to plant a specified number of seedlings; planting additional elderberry seedlings may be allowed when transplanting is not feasible.

Construction impacts also could occur during development of the habitat reserve system. Specific locations of all of the reserves are not identified and, therefore, it is not possible to determine the number of shrubs that could be affected by development of the habitat reserves. Reserve acquisitions to date have not included lands with existing elderberry shrubs, but it is possible that elderberry shrubs would be present on lands acquired in the future. If elderberry shrubs occur on habitat reserves, the Conservancy would strive to preserve the shrubs. If shrubs must be removed to develop habitat on the reserves, the Conservancy would mitigate in accordance with the Conservation Guidelines.

Effects of O&M Activities

Water Agencies

The existing system of canals and drains in the Natomas Basin is highly maintained, and therefore, is unlikely to contain mature elderberry shrubs that are potential habitat for the valley elderberry longhorn beetle. However, some areas under management by RD 1000 and Natomas Mutual (e.g., Fisherman's Lake, RD 1000 Pumping Plant No. 2) contain mature riparian habitat that could contain elderberry shrubs. Areas under the management of the water agencies that support mature riparian habitat necessarily are those areas in which the water agencies do not routinely conduct vegetation control. As a result, the water agencies' continued O&M activities are not likely to remove elderberry shrubs supporting or potentially supporting VELB. The potential for removal of elderberry shrubs of sufficient size to support VELB is limited to construction activities associated with facility replacement or restructuring of canals. The number of shrubs potentially impacted over the project duration by these activities and their suitability for VELB is unknown. Because of this uncertainty in combination with uncertainty regarding the current status of VELB both in the Natomas Basin and rangewide precludes a prediction of the effect of the water agencies' O&M activities on VELB.

Natomas Basin Conservancy

Some of the Conservancy's management actions on the reserves have the potential to remove elderberry shrubs. the Conservancy would implement measures to avoid and minimize take of VELB as a result of habitat management actions. the Conservancy would ensure that necessary and appropriate take avoidance measures are included in reserve management plans, as well as additional measures determined to be necessary during the development of management plans.

Overall Effects on Valley Elderberry Longhorn Beetle

With implementation of the avoidance and mitigation measures for construction and O&M activities, long-term protection of existing riparian habitat, and planting and protection of additional elderberry shrubs on the habitat reserves, implementation of the HCP would mitigate impacts of the covered activities and contribute to maintaining VELB in the Natomas Basin.

5.11 Delta Tule Pea (*Lathyrus jepsonii* var. *jepsonii*)

5.11.1 Species Description

The Delta tule pea is considered a Species of Concern by the USFWS, and is on List 1B of the California Native Plant Society (rare or endangered in California and elsewhere). Delta tule pea is a perennial herb that, like other members of the pea family, has a large, brightly colored pink to lavender flower with a distinctive banner and keel. The species, like other peas, has grasping tendrils and a climbing habit. Delta tule pea is most commonly associated with both brackish and freshwater marsh vegetation, but can root near the water and extend into adjacent riparian and upland areas.

Delta tule pea is known primarily from the Sacramento-San Joaquin River Delta. Most known occurrences are recorded from Solano (39 records), Contra Costa (15), Sacramento (14), and San Joaquin (9) Counties (CalFlora Occurrence Database, 2001). All Sacramento County occurrence records are from the Delta region, with the nearest reported occurrences in the Walnut Grove area. (CDFG, 2001). Delta tule pea is not known to occur in Sutter County. Little information is known about the population status of the Delta tule pea, but the species is considered by the California Native Plant Society to be threatened by agricultural practices, water diversions, and erosion (Skinner and Pavlic, 1994 [Sixth Edition]).

5.11.2 Environmental Effects

Effects of Changes in Habitat

Potential habitat for the Delta tule pea is found in marsh areas. In the Natomas Basin, ponds and seasonally wet areas are the primary potential habitat although some ditches and canals could provide suitable conditions. Rice lands are not suitable for Delta tule pea because these lands are managed to discourage colonization by plants other than rice and are harvested annually. The habitat classes (from Tables 4-3 and 4-4) that provide potential habitat for the Delta tule pea and the changes in acreage from implementing the HCP are presented in Table 5-11.

“Ponds and Seasonally Wet Areas” occur throughout the Natomas Basin as isolated units; the loss of 21 acres could occur in approximately six areas subject to urban development. Assuming that smaller canals and drains do not remain after development has occurred, about 404 acres of Class II, III, and IV canals and ditches would be removed in the three development areas. Some of these canals and ditches could provide suitable conditions for delta tule pea.

TABLE 5-11
Change in Potential Habitat for Delta Tule Pea (acres)

Habitat Class ^a	Baseline	City of Sacramento	Metro Air Park	Sutter County	Total Change	Future Condition
Ponds and seasonally wet areas	96	(7)	(4)	(10)	(21)	75
Canals (all)	1,778	(117)	(72)	(215)	(404)	1,374
Total	1,874	(124)	(76)	(225)	(425)	1,449

(#) decrease in acreage

Source: Habitat and Land Use Assessment Database (CH2M HILL, 2002).

Under the HCP, a stable and natural marsh environment would be created on 2,187.5 acres, thereby replacing the loss of 425 acres of potential habitat from urban development. This restored marsh area would substantially increase potential habitat for the Delta tule pea. Because Delta tule pea is not known to occur in the Natomas Basin and the Natomas Basin is outside this species known range, the loss of potential habitat because of urban development and subsequent increase in potential habitat on the habitat reserves could have no effect on the species. The HCP, however, includes a measure for the Conservancy to consider introducing the Delta tule pea into suitable locations in the Natomas Basin. If pursued, these introductions would benefit the species by increasing the population size and distribution.

Effects of Construction Activities

Delta tule pea is not expected to be affected by construction because the Natomas Basin is outside of the primary range of the species, and the species is not known to occur in the Natomas Basin. It is possible that construction activities (e.g., urban development, habitat reserve development) could affect existing unknown occurrences of Delta tule pea or areas colonized by this species future. Under the HCP, surveys for covered species, including Delta tule pea would be conducted prior to construction activities. If Delta tule pea were identified in construction areas, they could be salvaged and transplanted per the requirements of the California Native Plant Protection Act if deemed necessary and appropriate by the USFWS and CDFG.

Effects of O&M Activities

Water Agencies

Maintenance of the canal and drain system in the Natomas Basin could affect potential habitat for the Delta tule pea and directly removed individuals. These potential effects are unlikely to occur because the Natomas Basin is outside of the primary range of the species,

and the species is not known to currently occur in the project area. If this species' range expanded and it colonized the canals and ditches in the Natomas Basin, O&M activities conducted by Natomas Mutual and RD 1000 could impact individual plants.

The HCP does not include specific requirements for O&M activities to address potential impacts to Delta tule pea. However, the likelihood that this species would occur in the canals or ditches during the project duration is low because of the routine sediment and vegetation control maintenance activities. Natomas Mutual and RD 1000 conduct regular operation and maintenance activities on the canals and ditches. These types of activities would continue under the HCP. If Delta tule pea occurs, it would have colonized and persisted in the drains or canals coincident with these on-going activities. Therefore, if Delta tule pea naturally colonizes the ditches and canals in the future, it would be expected to persist.

Natomas Basin Conservancy

Over the short-term, the Conservancy's management activities on the habitat reserves would not be expected to affect Delta tule pea because this species is not known to occur in the Natomas Basin. Delta tule pea could colonize portions of the habitat reserves in the future and/or the Conservancy could pursue introductions of this species under the HCP. If this species becomes established in the habitat reserves, the Conservancy would implement measures to avoid and minimize take of plants. To determine if this plant colonizes the habitat reserves, the Conservancy will monitor for this species on the habitat reserves.

Overall Effects on Delta Tule Pea

Because this species does not currently occur in the Natomas Basin, the HCP would not affect this species during the short-term. The species would benefit if it was successfully introduced into the Natomas Basin.

5.12 Sanford's Arrowhead (*Sagittaria sanfordii*)

5.12.1 Species Description

Sanford's arrowhead is considered a Species of Concern by the USFWS, and is on List 1B of the California Native Plant Society (rare or endangered in California and elsewhere). Sanford's arrowhead is an aquatic perennial that occurs under shallow-water conditions in freshwater marshes. Sanford's arrowhead is known primarily from the Central Valley, although the species has been found in other areas of California as well. Most known occurrences are recorded from Sacramento (30 records), Merced (11), Fresno (10), Butte (8), and Tehama (6) Counties (CalFlora Occurrence Database, 2001). In Sacramento County, several occurrences are reported along the American River Parkway along small oxbows and sloughs (CDFG, 2001). Sanford's arrowhead is not known to occur in Sutter County. No occurrences are reported in the Natomas Basin.

5.12.2 Environmental Effects

Effects of Changes in Habitat

Potential habitat for the Sanford's arrowhead is found in marsh areas. In the Natomas Basin, ponds and seasonally wet areas are the primary potential habitat although some ditches and

canals could provide suitable conditions. Rice lands are not suitable for Sanford's arrowhead because these lands are managed to discourage colonization by plants other than rice and are harvested annually. The habitat classes (from Tables 4-3 and 4-4) that provide potential habitat for Sanford's arrowhead and the changes in acreage from implementing the HCP are presented in Table 5-12.

TABLE 5-12
Change in Potential Habitat for Sanford's Arrowhead (acres)

Habitat Class ^a	Baseline	City of Sacramento	Metro Air Park	Sutter County	Total Change	Future Condition
Ponds and seasonally wet areas	96	(7)	(4)	(10)	(21)	75
Canals (all)	1,778	(117)	(72)	(215)	(404)	1,374
Total	1,874	(124)	(76)	(225)	(425)	1,449

(#) decrease in acreage

Source: Habitat and Land Use Assessment Database (CH2M HILL, 2002).

"Ponds and Seasonally Wet Areas" occur throughout the Natomas Basin as isolated units, and the loss of 21 acres would occur in approximately six areas subject to urban development as a covered activity under the HCP. Assuming that canals and drains do not remain after development has occurred, about 404 acres of Class II, III, and IV canals and drains would be removed in the development areas, some of which could contain emergent marsh values suitable for Sanford's arrowhead.

Under the HCP, a stable and natural marsh environment would be created on 2,187.5 acres, thereby replacing the loss of 425 acres of potential habitat from urban development. This restored marsh area would substantially increase potential habitat for the Sanford's arrowhead. Because Sanford's arrowhead is not known to occur in the Natomas Basin, the loss of potential habitat because of urban development and subsequent increase in potential habitat on the habitat reserves could have no effect on the species. The HCP, however, includes a measure for the Conservancy to consider introducing the Sanford's arrowhead into suitable locations in the Natomas Basin. If pursued, these introductions would benefit the species by increasing the population size and distribution.

A stable marsh environment would be created as part of the habitat reserve system. This restored marsh area would substantially increase potential habitat for Sanford's arrowhead. Because Sanford's arrowhead is not known to occur in the Natomas Basin, the loss of habitat from covered activities is not anticipated to have an effect on the species. The HCP includes a measure for the Conservancy to consider introducing Sanford's arrowhead into suitable locations in the Natomas Basin, which would benefit the species by increasing its increased population size and distribution.

Effects of Construction Activities

Sanford's arrowhead is not expected to be affected by construction because the species is not believed to currently occur in the Natomas Basin. It is possible that construction activities (e.g., urban development, habitat reserve development) could affect existing unknown

occurrences of Sanford's arrowhead or areas colonized by this species future. Under the HCP, surveys for covered species, including Sanford's arrowhead would be conducted prior to construction activities. If Sanford arrowhead were identified in construction areas, they could be salvaged and transplanted per the requirements of the California Native Plant Protection Act if deemed necessary and appropriate by the USFWS and CDFG.

Effects of O&M Activities

Water Agencies

Maintenance of the canal and drain system in the Natomas Basin could affect individual of Sanford's arrowhead. The Natomas Basin is within the known range of Sanford's arrowhead, and this species could inhabit smaller canals and drains. The HCP does not include specific requirements for O&M activities to address potential impacts to Sanford's arrowhead. However, the likelihood that Sanford's arrowhead occur in the canals or ditches is low because of the routine sediment and vegetation control maintenance activities. Natomas Mutual and RD 1000 conduct regular operation and maintenance activities on the canals and ditches. These types of activities would continue under the HCP. If Sanford arrowhead occurs, it would have colonized and persisted in the drains or canals coincident with these on-going activities. Therefore, if Sanford's arrowhead currently occurs in the canals or ditches, it would be expected to persist.

Natomas Basin Conservancy

Over the short-term, the Conservancy's management activities on the habitat reserves would not be expected to affect Sanford's arrowhead because this species is not known to occur in the Natomas Basin. It could colonize portions of the habitat reserves in the future and/or the Conservancy could pursue introductions of this species under the HCP. If Sanford's arrowhead becomes established in the habitat reserves, the Conservancy would implement measures to avoid and minimize take of plants. To determine if this plant colonizes the habitat reserves, the Conservancy will monitor for this species on the habitat reserves.

Overall Effects on Sanford's Arrowhead

Because this species does not currently occur in the Natomas Basin, the HCP probably would not affect this species. The species would benefit if it was successfully introduced to suitable habitat in the Natomas Basin.

5.13 Vernal Pool Species

5.13.1 Species Description

Vernal pools represent important remnants of the natural landscape of the foothills and valley floor of the Central Valley. Resulting from a combination of surface topography (shallow, closed depressions) and soil condition (low permeability), vernal pools support numerous special-status species. Twelve species inhabiting vernal pools are identified in the HCP as potentially occurring in the Natomas Basin. These species include 5 plant species, 5 vernal pool shrimp species, and 2 amphibian species. Vernal pool acreage in the Natomas Basin is not known, and therefore is not specified in this section.

Boggs Lake Hedge-Hyssop (*Gratiola heterosepala*)

The Boggs Lake hedge-hyssop is a state-listed Endangered species. Boggs Lake hedge-hyssop (*Gratiola heterosepala*) is a small, semi-aquatic, herbaceous annual plant found in five widely disjunct areas in California: Boggs Lake in Lake County, Rio Linda and Elk Grove in Sacramento County and near Roseville in Placer County, Big Table Mountain in Fresno County, Kennedy Table in Madera County, and near the Pit River in Shasta County (CDFG, 2001). It has also been reported at one site in Lake County, Oregon (Skinner and Pavlik, 1994).

Boggs Lake hedge-hyssop occurs in shallow waters or moist clay (adobe) soils, in vernal pools, and along lake margins. Populations are usually composed of scattered individuals and is often associated with bractless hedge-hyssop, coyote thistle, hairy clover-fern (*Marsilea vestita*) and slender orcutt grass (*Orcuttia tenuis*). At higher elevations, such as Boggs Lake in Lake County and near the Pit River in Shasta County, this species is found in close proximity to foothill woodland species, such as black oak (*Quercus kelloggii*) and foothill pine (*Pinus sambiana*), and northern juniper woodland species, respectively. There are no known occurrences of this species in the Natomas Basin although limited potential suitable vernal pool habitat occurs along the far eastern boundary of the Basin north of Del Paso Road. This species has been identified in Rio Linda, approximately 2 miles east of the Natomas Basin (CDFG, 2001).

Sacramento Orcutt Grass (*Orcuttia viscida*) and Slender Orcutt Grass (*Orcuttia tenuis*)

Sacramento orcutt grass is listed as Endangered by both the state and federal Endangered Species Acts and is considered rare, threatened, or endangered in California and elsewhere (List 1B) by the CNPS (Skinner and Pavlik, 1994). Slender orcutt grass is listed as Threatened under the federal Endangered Species Act, Endangered under the state Endangered Species Act, and is considered rare and endangered (List 1B) by the CNPS (Skinner and Pavlik, 1994). These grasses (*Orcuttia viscida*, *O. tenuis*) are gray-green annual grass species typically occurring in medium to large vernal pools with relatively long inundation periods. These species are associated with very old alluvial surfaces (also referred to as high terrace land forms), such as historic flood plains of pre-historic rivers and creeks. Associated species include vernal pool endemic plants, such as common spikerush (*Eleocharis macrostachya*), rayless lasthenia (*Lasthenia glaberrima*), and coyote thistle (*Eryngium vaseyi*).

Sacramento orcutt grass has been identified at nine sites in Sacramento County; no known occurrences of this species in the Natomas Basin (CDFG, 2001). The closest known occurrences are reported in the vicinity of Kiefer Road in eastern Sacramento County, approximately 8 miles southeast of the Natomas Basin. Limited potential habitat for this species in the vernal pools along the eastern edge of the HCP area.

Slender orcutt grass is currently reported from 74 occurrences in California, of which 4 occurrences are reported extirpated and 3 others occurrences have not been relocated at previously reported locations (CDFG, 2001). Of the 70 extant occurrences, two are reported from Sacramento County, and no occurrences are reported from Sutter County. There are no known occurrences of this species in the Natomas Basin (CDFG, 2001). The closest known occurrences are in eastern Sacramento County between Kiefer Road and Rancho Seco. In general, vernal pools in Natomas Basin lack the high terrace landforms with which this

species is associated. Therefore, the potential for this species to occur in the Natomas Basin is low.

Colusa Grass (*Neostapfia colusana*)

Colusa grass is both a federally and state-listed Endangered species. It is also considered rare and endangered (List 1B) by the CNPS (Skinner and Pavlik, 1994). Colusa grass is a low, tufted annual plant. Colusa grass is usually found in fairly monotypic stands in the drying beds of larger vernal pools, usually occurring in the deepest portions of the pools (Stone et al., 1988; May Consulting, unpubl. record). When Colusa grass is present, other vernal pool plants are often sparse or absent. When found with other species, Colusa grass is often associated with Hoover's spurge or orcutt grasses (*Orcuttia* sp.) (Stone et al., 1988).

There are currently 59 known occurrences of Colusa grass in California. Of these occurrences, 48 are presumed extant, 7 are considered extirpated, and an additional 4 occurrences have not been relocated at the previously reported location. Of the 48 extant occurrences, none are reported from Sacramento and Sutter Counties. There are no known occurrences of this species in the Natomas Basin (CDFG, 2001).

Legenere (*Legenere limosa*)

Legenere is considered a federal Species of Concern and rare and endangered (List 1B) by the CNPS (Skinner and Pavlik, 1994). Legenere is found below 500 feet elevation (Hickman, 1993) along lakeshores and in vernal pools, marshes, and other seasonally inundated habitats. Legenere is commonly associated with stipitate popcornflower, common spikerush (*Eleocharis macrostachya*), rayless goldfields (*Lasthenia glaberrima*), and coyote thistle (May Consulting unpubl. record).

Currently, there are 49 known occurrences of legenere in California. Of these, 18 are reported from Sacramento County, and none is reported from Sutter County. There are no reported occurrences in the Natomas Basin, although potentially suitable vernal pool habitat occurs along the far eastern boundary of the Natomas Basin north of Del Paso Road.

Vernal Pool Fairy Shrimp (*Branchinecta lynchi*)

The vernal pool fairy shrimp is a federally listed Threatened species. The vernal pool fairy shrimp is a small (less than 1 inch) freshwater crustacean belonging to the order of fairy shrimp (*Anostraca*). Vernal pool fairy shrimp has one of the broadest distributions of the California endemic fairy shrimp species. This species is most often observed in vernal pools (79 percent of observations), although it is also observed in a variety of other natural and artificial habitats including seasonal wetlands, alkali pools, ephemeral drainages, stock ponds, roadside ditches, vernal swales, and rock outcrop vernal pools (Helm, 1998). The species occurs on many geologic formations and land forms. Regardless of the land form, this species is most often found in small and shallow habitats, although it also can occur in large and deep vernal pools (Helm, 1998). Vernal pool fairy shrimp often occurs with California linderiella, vernal pool tadpole shrimp, and occasionally with Conservancy fairy shrimp in the Vina Plains Preserve and is never the numerically dominant one (Eng et al., 1990).

There are 270 reported occurrences of vernal pool fairy shrimp in California, 50 of which are reported from Sacramento County and one of which is reported from Sutter County (CDFG, 2001). The reported occurrence in Sutter County is adjacent to the East Main Drain

in the Natomas Basin. There are also several occurrences east of the Natomas Basin in Elverta and Rio Linda (CDFG, 2001). California linderiella have been reported from two locations in the City of Sacramento's annexation area and in Sacramento County on the east side of the Natomas Basin. Because vernal pool fairy shrimp often are found in association with California linderiella, they could occur in these locations as well.

Vernal Pool Tadpole Shrimp (*Lepidurus packardii*)

The vernal pool tadpole shrimp is a federally listed Endangered species. The vernal pool tadpole shrimp is a small (less than 3 inches in length) aquatic crustacea within the tadpole shrimp order (*Notostraca*). The common name "tadpole shrimp" presumably addresses the general shape of the creature when viewed from above. Vernal pool tadpole shrimp is one of the three most common large branchiopods occurring in the Central Valley (Helm, 1998). It generally occurs in very small to very large vernal pools with a variety of depths and volumes of water during the wet cycle (Helm, 1998). The species is associated with vernal pools on the following geomorphologic surfaces: alluvial fan, basin, basin rim, flood plain, marine terrace, high terrace, stream terrace, very high terrace, low terrace, and volcanic mudflow land forms (Helm, 1998). The vernal pool tadpole shrimp has been observed in stock ponds, vernal pools, pools in old alluvial soil in grass bottom swales or mud-bottomed pools, and other seasonal wetlands (Helm, 1998). This species occurs with California linderiella, vernal pool fairy shrimp, and Conservancy fairy shrimp (Helm, 1998). Unlike many of the fairy shrimp eggs, the vernal pool tadpole shrimp eggs do not need to go through a freezing or drying period to hatch (Ahl, 1991).

There are 154 reported occurrences of vernal pool tadpole shrimp in California, of which 54 occurrences are reported from Sacramento County, and 4 from Sutter County (CDFG, 2001). One of reported occurrences in Sutter County is adjacent to the East Main Drain in the Natomas Basin.

Midvalley Fairy Shrimp (*Branchinecta mesovallensis*)

The midvalley fairy shrimp has no official state or federal listing, although it appears to meet the status of rare, threatened, or endangered under CEQA. The midvalley fairy shrimp is similar in morphology to the vernal pool fairy shrimp (Helm, pers. comm.) and is also a freshwater crustacean belonging to the order of fairy shrimp (*Anostraca*). This species occurs in grassland pools and intermound pools within mound-inter-mound topography. This species has been found inhabiting the most ephemeral of seasonal wetland types, presumably due to its ability of rapid maturity (Helm, 1998). This species appears to be a vernal pool obligate species, as it was observed to occur in vernal pools 93 percent of the time, and in vernal swales only 7 percent of the time (Helm, 1998). This species is associated with the smallest and most ephemeral vernal pools (Helm, 1998).

There are 14 known occurrences of midvalley fairy shrimp reported in California, of which one is reported from Sacramento County. No occurrences of midvalley fairy shrimp are reported from Sutter County and the Natomas Basin; however, suitable seasonal wetland and vernal pool habitat occurs along the extreme eastern edge of the Natomas Basin.

5.13.2 Environmental Effects

Effects of Changes in Habitat

Only a few small areas of vernal pools are known to occur in the Natomas Basin on the eastern edge of the basin. Several locations supporting vernal pool species (some of which are covered by the HCP) occur in areas potentially subject to urban development under the HCP. In addition to these known locations, isolated seasonal wetlands could occur elsewhere in the Natomas Basin and could support vernal pool vegetation and special-status vernal pool species.

Potential effects to vernal pool species consist of the direct loss of vernal pools because of construction as well as indirect effects. Urban development in areas surrounding vernal pools can change the hydrology of vernal pools which can change the suitability of the vernal pools for associated species. In addition, amphibians associated with vernal pools typically migrate between upland overwintering habitats and the breeding habitat of the vernal pool. Urban development around vernal pools can interfere with this movement and vehicular traffic can be a significant cause of mortality for some amphibians (e.g., tiger salamanders) during their movements between upland and aquatic habitats.

The HCP includes procedures to avoid, minimize and mitigate impacts to vernal pool species potentially resulting from development. Vernal pool resources within the City and the Sutter County Permit Areas would be identified prior to disturbance through pre-construction surveys and other biological investigations. Such resources would be discovered either through the early CEQA project review (required for general plan, specific plan, rezone, subdivision and other discretionary approvals of the Land Use Agencies) or during the pre-construction surveys required under the HCP. The following measures would be implemented by the Land Use Agencies prior to issuance of Urban Development Permits when public or private development projects are proposed for areas that may support wetlands and/or vernal pool species.

- If wetlands or potential wetlands are identified within the area of disturbance for a development project, then the project developer would obtain a verified delineation of jurisdictional waters of the U.S. from the U.S. Army Corps of Engineers (USCOE). If the USCOE determines the developer will conduct activities that would impact jurisdictional wetlands on the project site, the developer would obtain the necessary USCOE permits.
- If the USCOE determines there are jurisdictional wetlands on the project site and fill authorization is being requested pursuant to Section 404, prior to construction, the applicant shall obtain water quality certification/waiver of certification from the California Regional Water Quality Control Board under Section 401 of the Clean Water Act for the USCOE permit discussed above.
- If wetlands are determined to be jurisdictional and the Corps determines that listed species may be affected by the fill of wetlands, the Corps will consult with the Service under Section 7 of the ESA. Authorization for take and requirements for mitigation would be provided through a separate Section 7 consultation process and take authorization would not be granted to the Permittees under the HCP or the HCP Incidental Take Permits. However, the Land Use Agencies will require that a developer

subject to Section 404 and Section 7 adhere to the Section 7 consultation and the Corps permit as conditions of any Urban Development Permit.

If it is determined that wetland and/or vernal pool resources would be disturbed by a project, but that such resources do not involve jurisdictional wetlands, then take of vernal pool associated species would be covered under the HCP, subject to the following limitations and guidelines

- Where site investigations indicate vernal pool species may occur, and it has been determined that such resources do not involve jurisdictional wetlands, the developer would notify the Land Use Agency regarding the potential for impacts to vernal pool species. Such notification shall include biological data adequate to allow the Land Use Agency, and the USFWS and CDFG to determine the potential for impacts vernal pool species resulting from the proposed development.
- Following notification by the Land Use Agency, USWFS and CDFG would identify specific measures required to avoid, minimize and mitigate impacts to vernal pool species to be implemented prior to disturbance and in accordance with adopted standards or established guidelines.

With these measures, both direct (filling) and indirect (e.g., changes in hydrology) impacts to vernal pools and the associated species would be avoided or compensated.

As described previously, vernal pools would be protected under the HCP and therefore no adverse effects to vernal pool species would occur as a result of urban development or creation of habitat reserves. Depending on the specific characteristics of the upland and marsh habitat created in the habitat reserves, vernal pool species could be attracted to the habitat reserves. As part of the HCP, the Conservancy would periodically consult with experts to identify conservation opportunities for vernal pool species on the habitat reserves and thereby potentially establish additional populations of one or more of these species.

Effects of Construction Activities

Construction activities within the Natomas Basin are not likely to affect vernal pool species because no development is proposed in the few areas known to support vernal pool species. As an added assurance that impacts to vernal pool species would be avoided, prior to approval of Urban Development Permits, the involved Land Use Agency would require pre-construction surveys for vernal pool species. If the pre-construction surveys determine the presence of any of the covered species associated with vernal pools, the Land Use Agency would require the developer to consult with CDFG and/or USFWS to determine appropriate measures to avoid and minimize take of individuals.

Construction impacts also could occur during development of the habitat reserve system. Specific locations of the reserves are not identified and, therefore, it is not possible to determine if vernal pools or vernal pool species would be impacted. As part of the development of site-specific habitat creation and management plans, surveys to identify covered species currently or potentially supported by the specific parcel. If vernal pools or vernal pool species are found, impacts to these resource would be avoided during habitat creation and management activities and appropriate management activities pursued as necessary to retain resources values.

Effects of O&M Activities

Water Agencies

O&M activities are not likely to affect vernal pool species because suitable habitat for these species are restricted to vernal pools. These species are not expected to occur within water conveyance structures within RD1000's and Natomas Mutual's operations.

Natomas Basin Conservancy

As described above, habitat creation and management plans for the reserve system would be designed to protect vernal pool resources and associated covered species. If vernal pools species occur on the habitat reserves in the future, it is possible that some of the Conservancy's O&M activities could kill or injure individuals. The Conservancy will implement necessary and appropriate take avoidance measures included in reserve plans, as well as additional measures determined to be necessary during the development of management plans for the specific parcels.

Overall Effects on Vernal Pool Species

Currently, the Natomas Basin contains a minor amount of vernal pool habitat and use of the Natomas Basin by covered species appears to be very limited. The HCP includes measures to identify vernal pools or seasonal wetlands and avoid or mitigate impacts to vernal pools and associated species. One or more of the vernal pool species could benefit if the Conservancy was successful in attracting vernal pool species to the habitat reserves.

5.14 California Tiger Salamander (*Ambystoma californiense*)

5.14.1 Species Description

The California tiger salamander is a federal and state Candidate species. California tiger salamander is distinguished from other salamanders by its distinctive coloration consisting of spots or bars of white, cream or yellow on a black background. This species frequents slow-moving waters of swales, ponds and shallow lakes.

California tiger salamanders inhabit valley and foothill grasslands and open woodlands usually within 1 mile of water (Brode and McGinnis, pers. comm.). Adults spend much of their time underground. Adult California tiger salamanders are found under objects such as boards, rocks, brush or other wood debris or in rodent burrows near water. Tiger salamanders breed in reservoirs, ponds, vernal pools, small lakes, and slow-flowing streams that do not support predatory fish (Stebbins, 1972; Zeiner et al., 1988). Adult salamanders migrate from upland habitats to aquatic breeding sites during the first major rainfall events of the fall and early winter. Adults return to upland habitats after breeding. Juveniles disperse from aquatic breeding sites to habitats after metamorphosis. California tiger salamanders may not reproduce during years of low rainfall (Jennings et al., 1994).

There are 465 known tiger salamander occurrences in California (CDFG, 2001). Of these, four occurrences are in Sacramento County and one occurrence is in Sutter County; however, none of these occurrences is in the Natomas Basin. The nearest known tiger salamander occurrences are in northern Yolo County near Dunnigan and near Rancho Seco in southeastern Sacramento County. Vernal pools along the eastern edge of the Natomas Basin are considered potential, but marginal tiger salamander breeding habitat; no tiger

salamanders have been reported in these pools. Ponds and seasonally wet areas elsewhere in the Natomas Basin also could be used by tiger salamanders, but the species has not been reported in the basin.

5.14.2 Environmental Effects

Effects of Changes in Habitat

Potential habitat for California tiger salamander in the Natomas Basin consists of vernal pools and other ponds and seasonally wet areas and upland areas surrounding these features. Only a few small areas of vernal pools are known to occur in the Natomas Basin on the eastern edge of the basin. In addition, 96 acres of ponds and seasonally wet areas occur as isolated units throughout the Natomas Basin and are potential habitat for California tiger salamander.

Potential effects of the HCP on habitat for tiger salamander consist of the direct loss of vernal pools, ponds, or other seasonally wet areas and because of construction as well as indirect effects. Under the HCP, 21 acres of ponds and seasonally wet areas could be directly affected by development which could reduce the availability of breeding habitat for tiger salamander. Urban development in areas surrounding aquatic habitat also can directly affect habitat for tiger salamander by eliminating upland areas where tiger salamanders seek refuge during the much of the year. Tiger salamanders migrate between upland habitats and aquatic breeding habitat and urban development around aquatic habitats that tiger salamanders use for breeding can interfere with this movement. In some areas, vehicular traffic can be a significant cause of mortality for California tiger salamander during their movements between upland and aquatic habitats.

The HCP includes procedures to avoid, minimize and mitigate impacts to vernal pools as described under Section 5.15. *Vernal Pool Species*. The measures for vernal pool also would provide protection for many other aquatic habitats that California tiger salamanders could use. As a result of the requirements for vernal pools, generally, and tiger salamander specifically, impacts to habitat for this species would be avoided or mitigated.

Depending on the specific characteristics of the upland and managed marsh habitat provided on the reserves, tiger salamanders could be attracted to the habitat reserves. As part of the HCP, the Conservancy would periodically consult with experts to identify conservation opportunities for California tiger salamander on the habitat reserves. Such opportunities could include establishment or creation of wetland and upland habitats suitable for tiger salamanders within the reserve system (e.g., stock ponds or "artificial" vernal pools) and, if appropriate, re-introduction of tiger salamanders into the Basin.

Effects of Construction Activities

Construction activities within the Natomas Basin are not likely to affect California tiger salamander because this species is not currently known to inhabit the Natomas Basin. It is possible that construction activities could affect existing unknown occurrence of tiger salamanders or areas colonized by this species in the future. Under the HCP, prior to approval of Urban Development Permits, the involved Land Use Agency would require pre-construction surveys for tiger salamanders. If the pre-construction surveys determine the presence of California tiger salamander, the Land Use Agency would require the

developer to consult with CDFG to determine appropriate measures to avoid and minimize take of individuals.

Construction impacts also could occur during development of the habitat reserve system. As part of the development of site-specific habitat creation and management plans, surveys to identify covered species currently or potentially supported by the specific parcel would be conducted. If tiger salamanders are found, impacts to individuals would be avoided during habitat creation and management activities, and appropriate management activities pursued as necessary to retain habitat values for this species.

Effects of O&M Activities

Water Agencies

This species is not known to occur in the Natomas Basin, and RD 1000's and Natomas Mutual's water conveyance facilities do not provide suitable habitat for this species. O&M activities, therefore, are not likely to affect California tiger salamander.

Natomas Basin Conservancy

If tiger salamanders occur on the habitat reserves in the future, it is possible that some of the Conservancy's O&M activities could kill or injure individuals. The Conservancy will implement necessary and appropriate measures to avoid take included in reserve plans, as well as additional measures determined to be necessary during the development of management plans for the specific parcels. Further, the Conservancy will consult experts periodically during implementation of the HCP to identify additional conservation opportunities for this species in the habitat reserve system.

Overall Effects on the California Tiger Salamander

Currently, the Natomas Basin is not known to support California tiger salamander and contains a minor amount of potential habitat. The HCP includes measures to identify vernal pools and seasonal wetlands and avoid or mitigate impacts to these potential habitats for tiger salamander. California tiger salamander could benefit if the Conservancy was successful in attracting individuals to the habitat reserves or if it re-introduced the species to the habitat reserves.

5.15 Western Spadefoot Toad (*Scaphiopus intermontanus*)

5.15.1 Species Description

The western spadefoot toad is a California Species of Special Concern. This species occurs in shallow, seasonal wetlands (which are essential for breeding and egg-laying) in valley and foothill grasslands, open chaparral, and pine woodlands below 3,000 feet in elevation. This species is associated with seasonal wetlands and other temporarily ponded areas in low-lying grasslands, fields, washes, river flood plains, alluvial fans, alkali lakes and playas, but is also found in adjacent foothill and mountain habitats. Western spadefoot toads prefer slow-moving waters such as pools and plunge pools of small creeks, and short grasses with sandy or gravelly soils.

There are 173 known western spadefoot toad occurrences in California, of which five are in Sacramento County and none in Sutter County. There are no records of western spadefoot

toads in the Natomas Basin (CDFG, 2001). The nearest known occurrences are in Placer County at Fiddyment and Phillip Roads (about 6 miles east of the Natomas Basin) and at Mather Field in central Sacramento County. A few vernal pools that are suitable spadefoot toad breeding habitat occur along the far eastern edge of the Natomas Basin; however, there are no records for this species in this area to date. Ponds and seasonally wet areas elsewhere in the Natomas Basin also could be used by western spadefoot toad, but this species has not been reported in the basin.

5.15.2 Environmental Effects

Effects of Changes in Habitat

Potential habitat for western spadefoot toad in the Natomas Basin consists of vernal pools and other ponds and seasonally wet areas and upland areas surrounding these features. Only a few small areas of vernal pools are known to occur in the Natomas Basin on the eastern edge of the basin. In addition, 96 acres of ponds and seasonally wet areas occur as isolated units throughout the Natomas Basin and are potential habitat for western spadefoot toad.

Potential effects of the HCP on habitat for spadefoot toad consist of the direct loss of vernal pools, ponds, or other seasonally wet areas because of construction as well as indirect effects. Under the HCP, 21 acres of ponds and seasonally wet areas could be directly affected by development which could reduce the availability of breeding habitat for western spadefoot toad. Urban development in areas surrounding aquatic habitat also can directly affect habitat for spadefoot toad by eliminating upland areas where this species seeks refuge during the much of the year. Spadefoot toads move between upland habitats and aquatic breeding habitat and urban development around aquatic habitats that are used for breeding can interfere with this movement. Vehicular traffic can cause mortality of spadefoot toads during their movements between upland and aquatic habitats.

The HCP includes procedures to avoid, minimize and mitigate impacts to vernal pools as described under Section 5.15. *Vernal Pool Species*. The measures for vernal pool also would provide protection for other aquatic habitats that western spadefoot toad could use. As a result of the requirements for vernal pools, generally, and western spadefoot toad specifically, impacts to habitat for this species would be avoided or mitigated. Depending on the specific characteristics of the upland and managed marsh habitat provided in the reserves, spadefoot toads could be attracted to the habitat reserves. As part of the HCP, the Conservancy would periodically consult experts to identify conservation opportunities for western spadefoot toad on the habitat reserves.

Effects of Construction Activities

Construction activities within the Natomas Basin are not likely to affect western spadefoot toad because this species is not currently known to inhabit the Natomas Basin. It is possible that construction activities could affect existing unknown occurrence of spadefoot toads or areas colonized by this species in the future. Under the HCP, prior to approval of Urban Development Permits, the involved Land Use Agency would require pre-construction surveys for tiger salamanders. If the pre-construction surveys determine the presence of western spadefoot toad, the Land Use Agency would require the developer to consult with CDFG to determine appropriate measures to avoid and minimize take of individuals.

Construction impacts also could occur during development of the habitat reserve system. As part of the development of site-specific habitat creation and management plans, surveys to identify covered species currently or potentially supported by the specific parcel would be conducted. If western spadefoot toads were identified, impacts to individuals would be avoided during habitat creation and management activities, and appropriate management activities pursued as necessary to retain habitat values for this species.

Effects of O&M Activities

Water Agencies

This species is not known to occur in the Natomas Basin, and RD 1000's and Natomas Mutual's water conveyance facilities do not provide suitable habitat for this species. O&M activities, therefore, are not likely to affect western spadefoot toad.

Natomas Basin Conservancy

If western spadefoot toads occur on the habitat reserves in the future, it is possible that some of the Conservancy's O&M activities could kill or injure individuals. The Conservancy will implement necessary and appropriate measures to avoid take included in reserve plans, as well as additional measures determined to be necessary during the development of management plans for the specific parcels. Further, the Conservancy will consult experts periodically during implementation of the HCP to identify additional conservation opportunities for this species in the habitat reserve system.

Overall Effects on Western Spadefoot Toad

Currently, the Natomas Basin is not known to support western spadefoot toad and contains a minor amount of potential habitat. The HCP includes measures to identify vernal pools and seasonal wetlands and avoid or mitigate impacts to these potential habitats for spadefoot toad. The species could benefit if the Conservancy was successful in attracting individuals to the habitat reserves or if it introduced the species to the habitat reserves.

SECTION 6.0

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Appendix I

NBHCP Fee Update - 2002, by
Economic & Planning Systems, Inc.,
dated April 25, 2002.



Economic &
Planning Systems

Public Finance
Real Estate Economics
Regional Economics
Land Use Policy

MEMORANDUM

To: John Roberts, *Natomas Basin Conservancy*

From: Georgette Lorenzen and Allison Shaffer

Subject: NBHCP Fee Update -- 2002; EPS #12461

Date: April 25, 2002

EPS has updated the cash flow model used to estimate the Natomas Basin Habitat Conservation Plan (NBHCP) mitigation fee (the "fee") based on a number of factors that are detailed in this correspondence. The fee is composed of two components – the Base Fee and the Settlement Land Acquisition Premium (the 'Settlement Premium'). The proposed 2002 fee maintains the Settlement Premium adopted in 2001, which is due to stay in effect until October of 2002. This memorandum details the updated assumptions used to derive Base Fee amount.

Figure 1 summarizes the cost per acre of habitat and the mitigation fee for both the Base Fee and the Settlement Premium. The proposed fee level continues to assume the current HCP mitigation requirement of one half acre of mitigation land for each gross acre of developed land. Therefore, the fee shown reflects 50 percent of the cost per acre of habitat mitigation as shown in Figure 1.

The Base Fee is comprised of fee components for five funds as follows:

- Land Acquisition (LA)
- Restoration & Enhancement (RE)
- Administration/Operation & Maintenance (Admin/O&M)
- O&M Endowment
- Supplemental Endowment (for Land Acquisition)

The updated Base Fee amount was estimated based on a revised cash flow analysis prepared by EPS for each of the funds listed below. The updated assumptions are as follows:

SACRAMENTO

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1. **Fund Balance Adjustments:** The cash flows for each fund were updated such that the beginning balances in 2002 match actual fund balances of the NBHCP as of December 31, 2001.
2. **Land Acquisition Costs:** Land costs were increased from \$4,750 per acre to \$6,000 per acre (or \$11,000 per acre to \$12,250 per acre including the Settlement Premium). The increase in costs reflects increasing price pressure in the Natomas Basin for habitat preservation as witnessed by the Natomas Basin Conservancy (NBC).
3. **Restoration & Enhancement Costs:** In 2001 the NBC completed the first conversion of acquired acres into managed marsh (Betts/Kismat/Silva property totaling 192.5 acres). The cost to convert the acres was approximately \$1,000,000, or \$5,200 per acre. The estimated cost assumed in the 2001 update was \$2,482 per acre. Therefore, actual costs were nearly double estimated costs.

According to the NBC, estimated future costs of restoration and enhancement will be reduced somewhat from the Betts/Kismat/Silva property conversion costs. The 2002 cash flow analysis assumes a cost per acre of approximately \$5,000 per acre. In addition a contingency amount of 12% or \$164 per acre was added to the cost to cover the shortfall in revenues due to the difference in actual costs vs. budgeted costs and provide some cushion against future cost increases. As a result the total cost per acre for Restoration & Enhancement increased from \$736 per acre to \$1,565 per acre (actual cost weighted by 25% allocation of managed marsh to total acres).

In addition, the cost estimate (on a per acre basis) for completing site specific management plans for acquired mitigation land was increased from \$116 per acre to \$127 per acre. The cost increase reflects the most current cost estimate for the next site specific management plan to be completed by the NBC.

4. **Revised Administrative/O&M Cost Estimates:** Administrative costs were revised based on the current budget estimates of the NBC. Projected expenditures for property taxes were also increased. Assessed values of acquired mitigation land have increased resulting in an average value of \$5,100 per acre as compared to \$2,400 per acre assumed in 2001. Therefore the cost per acre for property taxes increased from \$24 per acre to \$51 per acre in Sutter County and \$25.60 to \$54.42 in Sacramento County.
5. **Hunting Revenues:** Projected hunting revenues are based on two primary assumptions as follows:
 - Net income will be \$12 per hunting acre
 - The percentage of mitigation land used for hunting increases from 30% in 2003 to 50% in 2009, and is maintained at 50% thereafter.

The second assumption reflects a change from the prior analysis. In 2001 it was assumed that the percentage of mitigation land used for hunting would increase from 30% in 2002 to 60% in 2010, and was maintained at 60% thereafter. The reduction in

acres hunted in the 2002 Update results in less hunting revenue generated. As a result, the Admin/O&M fee component was increased.

CASH FLOW ANALYSIS

The cash flows for each fund are summarized in **Figure 2**. The assumption tables for the cash flow analysis are presented in **Figure 3** through **Figure 5**

SUPPLEMENTAL ENDOWMENT FUND

The Supplemental Endowment fund was created in 2001 to provide additional revenue to allow the NBC to either purchase mitigation land in advance of requirements (such as establishing a 200 reserve land surplus) or to provide a cushion for land acquisition in the case that land prices spike in any given year before the fee can be adjusted accordingly. The fee revenues generated from the supplemental endowment fund are approximately \$160,000 annually through 2015. To the extent the supplemental endowment is not drawn down, interest earnings will accrue. **Figure 2** shows what the ending balance would be in the case the Supplemental Endowment fund is never drawn down. Once all land acquisition is completed, if a positive fund balance remains in the Supplemental Endowment, these monies could be transferred to the Admin/O&M fund for operations or the O&M Endowment fund at the discretion of the NBC Board of Directors.

Figure 1
Natomas Basin HCP
Estimation of Mitigation Fee

Assumes:
 17,500 acres of development
 1/2 acre of mitigation land per gross acre of developed land
 25% marsh

<i>Estimation of Mitigation Fee</i>					Notes:
Mitigation Requirement	1/2 Acre of Mitigation Land for Each Gross Acre of Developed Land				
Habitat Mitigation Fee	<u>Cost per Acre of Habitat</u>	<u>Mitigation Fee per Acre of Development</u>	<u>Percent of Base Fee</u>	<u>Percent of Total Fee</u>	
	<i>a</i>	<i>b=a x .5</i>	<i>(w/ Settlement Premium)</i>		
BASE FEE					
Land Acquisition Cost (LA)					
Land Cost	\$6,000 [1]	\$3,000			
Transaction Costs & Contingency	\$1,500 [1]	\$750			
Total Land Acquisition Cost (LA)	\$7,500	\$3,750	47%	31%	
Restoration/Enhancement (RE)					
RE Cost	\$1,401	\$700			
RE Contingency	\$164	\$82			
Total Restoration/Enhancement (RE)	\$1,565	\$782	10%	7%	
Administration/O & M	\$3,110 [2]	\$1,555	20%	13%	
O & M Endowment Fund	\$3,000 [2]	\$1,500	19%	13%	
Supplemental Endowment Fund	\$375	\$188	2%	2%	5% of land acquisition fee
Subtotal Mitigation Fee	\$15,550	\$7,775			
Fee Collection Administration		\$159	2%	1%	2% of fee for collection
Total Base Fee		\$7,934	100%	66%	
<hr/>					
SETTLEMENT PREMIUM (based on 2001 assumptions)					
Land Acquisition Cost (LA)					
Land Cost	\$6,250	\$3,125			
Transaction Costs & Contingency	1,645	\$822			
Total Land Acquisition Cost (LA)	7,895	\$3,947		33%	
Fee Collection Administration		\$81		1%	2% of fee for collection
Total Settlement Premium		\$4,028		34%	
TOTAL FEE		\$11,962		100%	

*assumptions3"

- [1] Based on information provided by the Natomas Basin Conservancy
 [2] Administration/O&M and Endowment Fund costs set based on cash flow analysis, ensuring that fund balances are positive in year 50 and that annual interest earnings in endowment fund exceed drawdown by Admin/O&M fund.

Figure 2
Natomas Basin HCP
Cash Flow Summary- 2002\$

Assumes:	0.0% Inflation
	3.0% Interest Rate

	Total 1996-2045	1 1996	2 1997	3 1998	4 1999	5 2000	6 2001	7 2002	8 2003
LAND ACQUISITION		[1]	[1]	[1]	[2]				
Beginning Balance		\$0	\$55,641	\$248,442	\$2,777,379	\$587,176	\$563,113	\$2,225,278	\$3,998,244
Total Revenues	\$64,875,701	\$55,641	\$192,801	\$2,528,936	\$2,734,795	\$1,287,471	\$3,198,070	\$3,928,346	\$6,602,502
Total Expenditures	(\$54,888,436)	\$0	\$0	\$0	(\$4,924,998)	(\$1,642,100)	(\$1,535,905)	(\$3,491,041)	(\$6,596,587)
Transfers from Admin/O&M Fund	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$1,335,661	(\$1,335,661)
Balance Adjustments	\$330,566	\$0	\$0	\$0	\$0	\$330,566	\$0	\$0	\$0
Ending Balance	\$10,317,832	\$55,641	\$248,442	\$2,777,379	\$587,176	\$563,113	\$2,225,278	\$3,998,244	\$2,668,497
RESTORATION & ENHANCEMENTS									
Beginning Balance		\$0	\$4,257	\$19,032	\$292,743	\$589,200	\$582,058	\$268,280	\$330,451
Total Revenues	\$12,308,413	\$4,257	\$14,775	\$273,711	\$296,457	\$145,324	\$746,644	\$396,759	\$1,365,844
Total Expenditures	(\$12,144,663)	\$0	\$0	\$0	\$0	\$0	(\$1,060,422)	(\$334,587)	(\$517,586)
Balance Adjustments	(\$152,466)	\$0	\$0	\$0	\$0	(\$152,466)	\$0	\$0	\$0
Ending Balance	\$11,284	\$4,257	\$19,032	\$292,743	\$589,200	\$582,058	\$268,280	\$330,451	\$1,178,709
ADMINISTRATION/O&M									
Beginning Balance		\$0	\$4,561	\$70,261	\$621,109	\$1,167,750	\$1,549,539	\$1,154,659	(\$111,024)
Total Revenues	\$57,086,691	\$4,561	\$65,700	\$657,778	\$878,604	\$686,626	\$816,275	\$956,100	\$2,951,730
Drawdown on Endowment Fund	\$16,318,765	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Total Expenditures	(\$73,048,066)	\$0	\$0	(\$106,930)	(\$331,964)	(\$547,446)	(\$611,155)	(\$886,122)	(\$1,001,443)
Balance Adjustments (Inc. Transfers)	(\$357,391)	\$0	\$0	\$0	\$0	\$242,609	(\$600,000)	(\$1,335,661)	\$1,335,661
Ending Balance	\$0	\$4,561	\$70,261	\$621,109	\$1,167,750	\$1,549,539	\$1,154,659	(\$111,024)	\$3,174,923
O&M ENDOWMENT									
Beginning Balance		\$0	\$3,041	\$13,622	\$152,066	\$323,846	\$463,981	\$1,003,066	\$1,788,158
Total Revenues	\$61,554,999	\$3,041	\$10,581	\$138,445	\$157,704	\$140,135	\$539,085	\$785,092	\$2,664,606
Drawdown on Endowment Fund	(\$16,318,765)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Balance Adjustments	\$14,076	\$0	\$0	\$0	\$14,076	\$0	\$0	\$0	\$0
Ending Balance	\$45,250,310	\$3,041	\$13,622	\$152,066	\$323,846	\$463,981	\$1,003,066	\$1,788,158	\$4,452,764
SUPPLEMENTAL ENDOWMENT									
Beginning Balance		\$0	\$0	\$0	\$0	\$0	\$0	\$73,498	\$169,453
Total Revenues	\$7,888,598	\$0	\$0	\$0	\$0	\$0	\$73,498	\$95,955	\$330,804
Drawdown	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Ending Balance	\$7,888,598	\$0	\$0	\$0	\$0	\$0	\$73,498	\$169,453	\$500,257

Figure 2
Natomas Basin HCP
Cash Flow Summary- 2002\$

	9 2004	10 2005	11 2006	12 2007	13 2008	14 2009	15 2010	16 2011	17 2012
LAND ACQUISITION									
Beginning Balance	\$2,668,497	\$3,674,828	\$4,261,960	\$4,809,041	\$5,364,328	\$5,927,945	\$6,500,015	\$7,080,667	\$7,670,029
Total Revenues	\$6,652,147	\$3,410,040	\$3,369,989	\$3,378,195	\$3,386,525	\$3,394,979	\$3,403,560	\$3,412,270	\$3,421,110
Total Expenditures	(\$5,645,816)	(\$2,822,908)	(\$2,822,908)	(\$2,822,908)	(\$2,822,908)	(\$2,822,908)	(\$2,822,908)	(\$2,822,908)	(\$2,822,908)
Transfers from Admin/O&M Fund	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Balance Adjustments	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Ending Balance	\$3,674,828	\$4,261,960	\$4,809,041	\$5,364,328	\$5,927,945	\$6,500,015	\$7,080,667	\$7,670,029	\$8,268,231
RESTORATION & ENHANCEMENTS									
Beginning Balance	\$1,178,709	\$1,838,887	\$1,000,201	\$330,218	\$408,268	\$487,957	\$569,320	\$652,391	\$737,207
Total Revenues	\$1,383,657	\$718,069	\$700,456	\$686,387	\$688,026	\$689,699	\$691,408	\$693,152	\$694,934
Total Expenditures	(\$723,479)	(\$1,556,755)	(\$1,370,440)	(\$608,337)	(\$608,337)	(\$608,337)	(\$608,337)	(\$608,337)	(\$608,337)
Balance Adjustments	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Ending Balance	\$1,838,887	\$1,000,201	\$330,218	\$408,268	\$487,957	\$569,320	\$652,391	\$737,207	\$823,804
ADMINISTRATION/O&M									
Beginning Balance	\$3,174,923	\$5,258,877	\$5,971,849	\$6,622,939	\$7,272,693	\$7,924,093	\$8,578,761	\$9,234,419	\$9,883,703
Total Revenues	\$3,131,104	\$1,867,931	\$1,902,327	\$1,956,666	\$2,012,938	\$2,069,781	\$2,123,296	\$2,176,840	\$2,230,194
Drawdown on Endowment Fund	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Total Expenditures	(\$1,047,150)	(\$1,154,959)	(\$1,251,236)	(\$1,306,912)	(\$1,361,538)	(\$1,415,113)	(\$1,467,638)	(\$1,527,556)	(\$1,587,475)
Balance Adjustments (Inc. Transfers)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Ending Balance	\$5,258,877	\$5,971,849	\$6,622,939	\$7,272,693	\$7,924,093	\$8,578,761	\$9,234,419	\$9,883,703	\$10,526,422
O&M ENDOWMENT									
Beginning Balance	\$4,452,764	\$7,197,516	\$8,721,947	\$10,292,335	\$11,910,069	\$13,576,578	\$15,293,336	\$17,061,859	\$18,883,712
Total Revenues	\$2,744,752	\$1,524,430	\$1,570,388	\$1,617,734	\$1,666,509	\$1,716,758	\$1,768,524	\$1,821,853	\$1,876,793
Drawdown on Endowment Fund	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Balance Adjustments	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Ending Balance	\$7,197,516	\$8,721,947	\$10,292,335	\$11,910,069	\$13,576,578	\$15,293,336	\$17,061,859	\$18,883,712	\$20,760,506
SUPPLEMENTAL ENDOWMENT									
Beginning Balance	\$500,257	\$840,985	\$1,029,074	\$1,222,807	\$1,422,351	\$1,627,881	\$1,839,578	\$2,057,625	\$2,282,214
Total Revenues	\$340,728	\$188,090	\$193,732	\$199,544	\$205,531	\$211,697	\$218,047	\$224,589	\$231,327
Drawdown	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Ending Balance	\$840,985	\$1,029,074	\$1,222,807	\$1,422,351	\$1,627,881	\$1,839,578	\$2,057,625	\$2,282,214	\$2,513,541

Figure 2
Natomas Basin HCP
Cash Flow Summary- 2002\$

	18 2013	19 2014	20 2015	21 2016	22 2017	23 2018	24 2019	25 2020
LAND ACQUISITION								
Beginning Balance	\$8,268,231	\$8,875,406	\$9,491,688	\$10,117,215	\$10,317,832	\$10,317,832	\$10,317,832	\$10,317,832
Total Revenues	\$3,430,083	\$3,439,191	\$3,448,435	\$200,616	\$0	\$0	\$0	\$0
Total Expenditures	(\$2,822,908)	(\$2,822,908)	(\$2,822,908)	\$0	\$0	\$0	\$0	\$0
Transfers from Admin/O&M Fund	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Balance Adjustments	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Ending Balance	\$8,875,406	\$9,491,688	\$10,117,215	\$10,317,832	\$10,317,832	\$10,317,832	\$10,317,832	\$10,317,832
RESTORATION & ENHANCEMENTS								
Beginning Balance	\$823,804	\$912,219	\$1,002,491	\$1,094,659	\$564,466	\$11,284	\$11,284	\$11,284
Total Revenues	\$696,752	\$698,609	\$700,505	\$22,988	\$0	\$0	\$0	\$0
Total Expenditures	(\$608,337)	(\$608,337)	(\$608,337)	(\$553,181)	(\$553,181)	\$0	\$0	\$0
Balance Adjustments	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Ending Balance	\$912,219	\$1,002,491	\$1,094,659	\$564,466	\$11,284	\$11,284	\$11,284	\$11,284
ADMINISTRATION/O&M								
Beginning Balance	\$10,526,422	\$11,162,378	\$11,791,369	\$12,411,461	\$11,751,733	\$11,041,704	\$10,310,374	\$9,557,105
Total Revenues	\$2,283,350	\$2,336,304	\$2,386,894	\$1,054,844	\$1,035,052	\$1,013,751	\$991,811	\$969,213
Drawdown on Endowment Fund	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Total Expenditures	(\$1,647,394)	(\$1,707,313)	(\$1,766,802)	(\$1,714,572)	(\$1,745,081)	(\$1,745,081)	(\$1,745,081)	(\$1,745,081)
Balance Adjustments (Inc. Transfers)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Ending Balance	\$11,162,378	\$11,791,369	\$12,411,461	\$11,751,733	\$11,041,704	\$10,310,374	\$9,557,105	\$8,781,237
O&M ENDOWMENT								
Beginning Balance	\$20,760,506	\$22,693,899	\$24,685,601	\$26,737,375	\$27,548,155	\$28,383,604	\$29,244,477	\$30,131,551
Total Revenues	\$1,933,393	\$1,991,703	\$2,051,774	\$810,780	\$835,449	\$860,873	\$887,074	\$914,076
Drawdown on Endowment Fund	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Balance Adjustments	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Ending Balance	\$22,693,899	\$24,685,601	\$26,737,375	\$27,548,155	\$28,383,604	\$29,244,477	\$30,131,551	\$31,045,627
SUPPLEMENTAL ENDOWMENT								
Beginning Balance	\$2,513,541	\$2,751,807	\$2,997,221	\$3,249,998	\$3,347,498	\$3,447,923	\$3,551,361	\$3,657,901
Total Revenues	\$238,266	\$245,414	\$252,777	\$97,500	\$100,425	\$103,438	\$106,541	\$109,737
Drawdown	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Ending Balance	\$2,751,807	\$2,997,221	\$3,249,998	\$3,347,498	\$3,447,923	\$3,551,361	\$3,657,901	\$3,767,639

Figure 2
Natomas Basin HCP
Cash Flow Summary- 2002\$

	26 2021	27 2022	28 2023	29 2024	30 2025	31 2026	32 2027	33 2028	34 2029
LAND ACQUISITION									
Beginning Balance	\$10,317,832	\$10,317,832	\$10,317,832	\$10,317,832	\$10,317,832	\$10,317,832	\$10,317,832	\$10,317,832	\$10,317,832
Total Revenues	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Total Expenditures	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Transfers from Admin/O&M Fund	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Balance Adjustments	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Ending Balance	\$10,317,832								
RESTORATION & ENHANCEMENTS									
Beginning Balance	\$11,284	\$11,284	\$11,284	\$11,284	\$11,284	\$11,284	\$11,284	\$11,284	\$11,284
Total Revenues	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Total Expenditures	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Balance Adjustments	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Ending Balance	\$11,284								
ADMINISTRATION/O&M									
Beginning Balance	\$8,781,237	\$7,982,093	\$7,158,975	\$6,311,163	\$5,437,917	\$4,538,474	\$3,612,047	\$2,657,828	\$1,674,982
Total Revenues	\$945,937	\$921,963	\$897,269	\$871,835	\$845,638	\$818,654	\$790,861	\$762,235	\$732,749
Drawdown on Endowment Fund	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Total Expenditures	(\$1,745,081)	(\$1,745,081)	(\$1,745,081)	(\$1,745,081)	(\$1,745,081)	(\$1,745,081)	(\$1,745,081)	(\$1,745,081)	(\$1,745,081)
Balance Adjustments (Inc. Transfers)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Ending Balance	\$7,982,093	\$7,158,975	\$6,311,163	\$5,437,917	\$4,538,474	\$3,612,047	\$2,657,828	\$1,674,982	\$662,650
O&M ENDOWMENT									
Beginning Balance	\$31,045,627	\$31,987,530	\$32,958,111	\$33,958,249	\$34,988,846	\$36,050,835	\$37,145,176	\$38,272,861	\$39,434,909
Total Revenues	\$941,903	\$970,582	\$1,000,137	\$1,030,597	\$1,061,989	\$1,094,342	\$1,127,684	\$1,162,048	\$1,197,464
Drawdown on Endowment Fund	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Balance Adjustments	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Ending Balance	\$31,987,530	\$32,958,111	\$33,958,249	\$34,988,846	\$36,050,835	\$37,145,176	\$38,272,861	\$39,434,909	\$40,632,373
SUPPLEMENTAL ENDOWMENT									
Beginning Balance	\$3,767,639	\$3,880,668	\$3,997,088	\$4,117,000	\$4,240,510	\$4,367,726	\$4,498,757	\$4,633,720	\$4,772,732
Total Revenues	\$113,029	\$116,420	\$119,913	\$123,510	\$127,215	\$131,032	\$134,963	\$139,012	\$143,182
Drawdown	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Ending Balance	\$3,880,668	\$3,997,088	\$4,117,000	\$4,240,510	\$4,367,726	\$4,498,757	\$4,633,720	\$4,772,732	\$4,915,914

Figure 2
Natomas Basin HCP
Cash Flow Summary- 2002\$

	35 2030	36 2031	37 2032	38 2033	39 2034	40 2035	41 2036	42 2037	43 2038
LAND ACQUISITION									
Beginning Balance	\$10,317,832	\$10,317,832	\$10,317,832	\$10,317,832	\$10,317,832	\$10,317,832	\$10,317,832	\$10,317,832	\$10,317,832
Total Revenues	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Total Expenditures	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Transfers from Admin/O&M Fund	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Balance Adjustments	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Ending Balance	\$10,317,832								
RESTORATION & ENHANCEMENTS									
Beginning Balance	\$11,284	\$11,284	\$11,284	\$11,284	\$11,284	\$11,284	\$11,284	\$11,284	\$11,284
Total Revenues	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Total Expenditures	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Balance Adjustments	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Ending Balance	\$11,284								
ADMINISTRATION/O&M									
Beginning Balance	\$662,650	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Total Revenues	\$702,380	\$682,500	\$682,500	\$682,500	\$682,500	\$682,500	\$682,500	\$682,500	\$682,500
Drawdown on Endowment Fund	\$380,051	\$1,062,581	\$1,062,581	\$1,062,581	\$1,062,581	\$1,062,581	\$1,062,581	\$1,062,581	\$1,062,581
Total Expenditures	(\$1,745,081)	(\$1,745,081)	(\$1,745,081)	(\$1,745,081)	(\$1,745,081)	(\$1,745,081)	(\$1,745,081)	(\$1,745,081)	(\$1,745,081)
Balance Adjustments (Inc. Transfers)	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Ending Balance	\$0								
O&M ENDOWMENT									
Beginning Balance	\$40,632,373	\$41,486,286	\$41,683,887	\$41,888,040	\$42,098,966	\$42,316,894	\$42,542,062	\$42,774,715	\$43,015,105
Total Revenues	\$1,233,965	\$1,260,182	\$1,266,734	\$1,273,507	\$1,280,509	\$1,287,749	\$1,295,233	\$1,302,972	\$1,310,973
Drawdown on Endowment Fund	(\$380,051)	(\$1,062,581)	(\$1,062,581)	(\$1,062,581)	(\$1,062,581)	(\$1,062,581)	(\$1,062,581)	(\$1,062,581)	(\$1,062,581)
Balance Adjustments	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Ending Balance	\$41,486,286	\$41,683,887	\$41,888,040	\$42,098,966	\$42,316,894	\$42,542,062	\$42,774,715	\$43,015,105	\$43,263,497
SUPPLEMENTAL ENDOWMENT									
Beginning Balance	\$4,915,914	\$5,063,391	\$5,215,293	\$5,371,752	\$5,532,904	\$5,698,891	\$5,869,858	\$6,045,954	\$6,227,332
Total Revenues	\$147,477	\$151,902	\$156,459	\$161,153	\$165,987	\$170,967	\$176,096	\$181,379	\$186,820
Drawdown	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Ending Balance	\$5,063,391	\$5,215,293	\$5,371,752	\$5,532,904	\$5,698,891	\$5,869,858	\$6,045,954	\$6,227,332	\$6,414,152

Figure 2
Natomas Basin HCP
Cash Flow Summary- 2002\$

	44 2039	45 2040	46 2041	47 2042	48 2043	49 2044	50 2045
LAND ACQUISITION							
Beginning Balance	\$10,317,832	\$10,317,832	\$10,317,832	\$10,317,832	\$10,317,832	\$10,317,832	\$10,317,832
Total Revenues	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Total Expenditures	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Transfers from Admin/O&M Fund	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Balance Adjustments	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Ending Balance	\$10,317,832						
RESTORATION & ENHANCEMENTS							
Beginning Balance	\$11,284	\$11,284	\$11,284	\$11,284	\$11,284	\$11,284	\$11,284
Total Revenues	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Total Expenditures	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Balance Adjustments	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Ending Balance	\$11,284						
ADMINISTRATION/O&M							
Beginning Balance	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Total Revenues	\$682,500	\$682,500	\$682,500	\$682,500	\$682,500	\$682,500	\$682,500
Drawdown on Endowment Fund	\$1,062,581	\$1,062,581	\$1,062,581	\$1,062,581	\$1,062,581	\$1,062,581	\$1,062,581
Total Expenditures	(\$1,745,081)	(\$1,745,081)	(\$1,745,081)	(\$1,745,081)	(\$1,745,081)	(\$1,745,081)	(\$1,745,081)
Balance Adjustments (Inc. Transfers)	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Ending Balance	\$0						
O&M ENDOWMENT							
Beginning Balance	\$43,263,497	\$43,520,162	\$43,785,380	\$44,059,442	\$44,342,650	\$44,635,313	\$44,937,756
Total Revenues	\$1,319,245	\$1,327,799	\$1,336,643	\$1,345,788	\$1,355,245	\$1,365,023	\$1,375,135
Drawdown on Endowment Fund	(\$1,062,581)	(\$1,062,581)	(\$1,062,581)	(\$1,062,581)	(\$1,062,581)	(\$1,062,581)	(\$1,062,581)
Balance Adjustments	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Ending Balance	\$43,520,162	\$43,785,380	\$44,059,442	\$44,342,650	\$44,635,313	\$44,937,756	\$45,250,310
SUPPLEMENTAL ENDOWMENT							
Beginning Balance	\$6,414,152	\$6,606,577	\$6,804,774	\$7,008,918	\$7,219,185	\$7,435,761	\$7,658,833
Total Revenues	\$192,425	\$198,197	\$204,143	\$210,268	\$216,576	\$223,073	\$229,765
Drawdown	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Ending Balance	\$6,606,577	\$6,804,774	\$7,008,918	\$7,219,185	\$7,435,761	\$7,658,833	\$7,888,598

cash flow

10

Figure 3
Natomas Basin HCP
Land Acquisition and Restoration/Enhancements Cost
and Acquired Habitat Land Utilization Assumptions

Assumes:
 17,500 acres of development
 1/2 acre of mitigation land per gross acre of developed land
 25% marsh

Part A - Assumptions				Notes:
Inflation	0.0%			
Interest Rate	3.0%			
Land Acquisition Values per Acre	<u>Land Value</u>	<u>Permitted by Plan</u>	<u>Assumed in Financial Analysis</u>	
In-Basin Lands	\$6,000	80%	100%	Estimated \$4,000-\$9,000 per acre range Estimated \$3,100-\$3,500 per acre range per Recent Experience of NBHCP
Out-of-Basin Lands	\$3,250	20%	0%	
Average Land Value (1)	\$6,000	Use In-Basin Land Value		
Plus Transaction Costs & Contingency	\$1,500	per Acre		
Average Land Acquisition Cost	\$7,500	per acquired acre		Beginning 1/1/01
2002 Habitat Acres				
Average Land Value	\$9,500	per acquired acre		
Plus Transaction Costs & Contingency	\$1,500	per acquired acre		
Average Land Acquisition Cost	\$11,000	per acquired acre		
Estimated Use of In-Basin Lands				
Marsh	25%			
Existing Rice	50%			
Other/Upland	25%			
Total Initial Use	100%			
Rice Converted to Marsh		After year 5, 324 acres in marsh 25% thereafter		
Rice Lands (excluding land converted to marsh) (7)				
Uplands/Fallow	10%			
Leased for Other Crops	0%			
Leased Rice Base Land	90%			
Total Rice Lands	100%			
Initial Restoration/Enhancement Expended At Time Land Is Acquired	<u>Use of Land</u>	<u>Initial Costs</u>	<u>Weighted Cost (6)</u>	
Marsh (2)	0%	\$0	\$0	Note (3)
Existing Rice	75%	\$0	\$0	Note (3)
Dry Converted to Rice	0%	\$0	\$0	Note (3)
Other Upland	25%	\$0	\$0	Note (3)
Subtotal	100%		\$0	
Expended At Time Land Is Converted				
Rice/Other Converted to Marsh	25%	\$5,095	\$1,274	Note (4)
Site Specific Plan Costs			\$127 per acre	Note (5)
Average Cost per Habitat Acre			\$1,401	Weighted average cost per acre

assumptions1

Source: Natomas Basin Conservancy

- (1) Assumes all acquisition occurs at the average in-basin land value.
- (2) Initial use of marsh land estimated at 0% because NBHCP estimates that little to no marshland is available for acquisition. However, rice land will be converted to marsh land.
- (3) The initial costs of marsh, existing rice, dry land converted to rice and other upland have been set to zero as no initial restoration or enhancement costs are anticipated.
- (4) The current estimate of \$5,095 per acre is based on the estimate of \$1,235,000 spent to convert 242.4 acres to marsh through 2002.
- (5) The site specific plan cost per acre is estimated as the cost of the site specific plans prepared through 2001 divided by the total acres of all properties except Ayala, which is not yet in the plan (\$224,571 / 1,772 acres).
- (6) The cost of restoration and enhancement is weighted by the percent of acres assumed to be converted or used for that particular land use.
- (7) Rice Lands percents included for cost and revenue calculation purposes only.

Figure 4
Natomas Basin HCP
Operations & Maintenance Assumptions

Assumes: 17,500 acres of development 1/2 acre of mitigation land per gross acre of developed land 25% marsh

Part A - Assumptions Con't		Notes:
Operations & Maintenance Costs		
Marsh	\$281.00 per acre	Updated Cost -- May 2001 Based on Wildlands, Inc. Estimates Based on Wildlands, Inc. Estimates alfalfa, safflower, etc.
Upland/Fallow	\$18.25 per acre	
Land Leased for Planted Rice Base	\$2.96 per acre	
Land Leased for Other Crops	\$2.96 per acre	
Other	\$0.00 per acre	
Hunting	\$0.00 per acre	
Misc./Monitoring/Adaptive Mgmt.	\$27.35 per acre	Updated Cost -- May 2001 Based on Wildlands, Inc. Estimates
Special Assessment & Property Tax Costs		
<u>Sacramento County</u>		
Reclamation District #1000	\$13.08 per acre	Based on published tariffs and rates Based on published tariffs and rates Based on published tariffs and rates Based on published tariffs and rates
NCMWA	\$0.42 per acre	
SAFCA O&M Assessment #1	\$5.69 per acre	
CSAI Safety Lights	\$0.08 per acre	
Property Tax [1]	\$54.42 per acre	Based on average assessed value of all properties acquired through Feb. 2002 -- \$5,100 per acre
Subtotal Sacramento County	\$73.68 per acre	
<u>Sutter County</u>		
Reclamation District #1000	\$13.08 per acre	Based on published tariffs and rates Based on published tariffs and rates
NCMWC	\$0.42 per acre	
Property Tax	\$51.00 per acre	Based on average assessed value of all properties acquired through Feb. 2002 -- \$5,100 per acre
Subtotal Sutter County	\$64.50 per acre	
Administrative Costs		
During Development	\$551,598 per year	Figure 5 for detail phased in over 3- 5 years
After All Land Acquired	\$468,858 per year	
Operations & Maintenance Revenues		
Crop Land Leases		
<u>Through 2002</u>		
Planted Rice Base Acreage	\$160 per acre/year	normal ag. practices
Other Crops (Flex. acreage)	\$80 per acre/year	normal ag. practices
<u>2003 +</u>		
Planted Rice Base Acreage	\$160 per acre/year	normal ag. practices
Other Crops (Flex. acreage)	\$80 per acre/year	normal ag. practices
Hunting		
Hunting Revenue per Acre	\$12 per acre	Based on Wildlands Estimate for initial Site Plan

Source: Natomas Basin Conservancy

assumptions2

[1] Includes G.O. bond assessment.

Figure 5
Natomas Basin HCP
Estimated Annual Natomas Basin Conservancy (NBC) Administrative Cost

	Annual Cost	Notes
<u>Administrative Expenses</u>		
Staff	\$195,000	
Benefits	\$64,350	
Board Expense	\$6,000	
Subtotal	\$265,350	
<u>Office Expense</u>		
Rent	\$20,000	
Telephone	\$1,700	
Copying & Printing	\$16,000	
Office Supplies	\$5,000	
Postage	\$600	
Equipment	\$2,500	
Auto Expense	\$6,500	
Subtotal	\$52,300	
<u>Miscellaneous Expense</u>		
Insurance	\$25,000	Liability and E&O
Accounting	\$20,000	
Legal	\$80,000	
Corporate Taxes	\$1,000	
Subtotal	\$126,000	
Contract Work/ Public Education/ Publications/Monitoring/Reports, etc.	\$36,000	
Subtotal Costs	\$479,650	
Contingency	\$71,948	15% Contingency
Total Administration During Habitat Acquisition Phas	\$551,598	
Total Administration After Habitat Acquisition	\$468,858	[1]

"admin"

Source: NBC FY 2001 budget estimate

[1] Administrative costs are reduced by 15% after all habitat lands have been acquired per John Roberts.

Appendix J

Documents Regarding Sacramento
Area Flood Control Agency Army
Corps of Engineers Permit
Compliance.



REPLY TO
ATTENTION OF

DEPARTMENT OF THE ARMY
U.S. ARMY ENGINEER DISTRICT, SACRAMENTO
CORPS OF ENGINEERS
1325 J STREET
SACRAMENTO, CALIFORNIA 95814-2922

DEPARTMENT OF THE ARMY PERMIT

Permittee: Sacramento Area Flood Control Agency
F.I. Hodgkins, Executive Director
926 J Street, Suite 424
Sacramento, California 95814

Permit Number: 199200719

Issuing Office: U.S. Army Engineer District, Sacramento
Corps of Engineers
1325 "J" Street
Sacramento, California 95814-2922

NOTE: The term "you" and its derivatives, as used in this permit, means the permittee or any future transferee. The term "this office" refers to the appropriate district or division office of the Corps of Engineers having jurisdiction over the permitted activity or the appropriate official of that office acting under the authority of the commanding officer.

You are authorized to perform work in accordance with the terms and conditions specified below.

Project Description:

The discharges of dredged or fill material into waters of the United States associated with the following activities are authorized by this permit:

- a. Raising the levees along the Natomas East Main Drain (NEMDC) using top only and sliver fill techniques.
- b. Construction of a new 1000 cfs pump station on the NEMDC approximately 2600 north of Dry Creek.
- c. Replacing the existing Main Avenue Bridge with a new four-lane structure.
- d. Raising the levee, rebuilding the levee access road, and modifying the stoplog structures on Arcade Creek between the NEMDC and Marysville Boulevard.
- e. Enlarging existing levees, construction of a new levee segment and construction of a floodwall along Dry Creek between the NEMDC and Marysville/Rio Linda Boulevard.
- f. Extending the NEMDC north to Sankey Road.
- g. Constructing a stoplog structure, a retaining wall, and raising the existing levee along the Pleasant Grove Creek Canal.
- h. Raising the Natomas Cross Canal south levee between the Sacramento River and State Highway 99 along its existing alignment.

All work is to be completed in accordance with the attached plan(s).

Project Location:

The project is located in the City of Sacramento and Sacramento and Sutter Counties as shown on the attached location maps.

Permit Conditions

General Conditions:

1. The time limit for completing the work authorized ends on 31 March 1999. If you find that you need more time to complete the authorized activity, submit your request for a time extension to this office for consideration at least one month before the above date is reached.
2. You must maintain the activity authorized by this permit in good condition and in conformance with the terms and conditions of this permit. You are not relieved of this requirement if you abandon the permitted activity, although you may make a good faith transfer to a third party in compliance with General Condition 4 below. Should you wish to cease to maintain the authorized activity or should you desire to abandon it without a good faith transfer, you must obtain a modification of this permit from this office, which may require restoration of the area.
3. If you discover any previously unknown historic or archeological remains while accomplishing the activity authorized by this permit, you must immediately notify this office of what you have found. We will initiate the Federal and state coordination required to determine if the remains warrant a recovery effort or if the site is eligible for listing in the National Register of Historic Places.
4. If you sell the property associated with this permit, you must obtain the signature of the new owner in the space provided and forward a copy of the permit to this office to validate the transfer of this authorization.
5. If a conditioned water quality certification has been issued for your project, you must comply with the conditions specified in the certification as special conditions to this permit. For your convenience, a copy of the certification is attached if it contains such conditions.
6. You must allow representatives from this office to inspect the authorized activity at any time deemed necessary to ensure that it is being or has been accomplished in accordance with the terms and conditions of your permit.

Special Conditions:

a. The Permittee shall fully implement all measures described in the Wetland Mitigation Plan for the Revised Natomas Area Flood Control Improvement Project, March 1994. The contents of this document are expressly incorporated into the terms of this permit except as otherwise modified by these Special Conditions. Permit Special Conditions shall supersede similar or conflicting conditions within this and other documents named within these special conditions.

Wetland mitigation acreage shall be 28.62 as described in the Wetland Mitigation Plan for the Revised Natomas Area Flood Control Improvement Project.

b. Construction of the compensatory mitigation areas shall commence concurrently with or in advance of the start of construction of the authorized activity and be complete within two years. The permittee shall notify the District Engineer of the start date and the completion date of mitigation construction in writing and no later than ten (10) calendar days after each date.

c. The following actions shall be taken prior to the start of construction of the authorized project.

1. Establishment of a long term funding mechanism intended to provide for maintenance and monitoring of mitigation areas.

2. Recordation of deed restrictions maintaining all preservation and mitigation areas as wetland preserve and wildlife habitat in perpetuity. Copies of the proposed deed restriction language shall be provided to the Corps of Engineers for approval prior to recordation.

3. Copies of the recorded documents shall be provided to the Corps of Engineers no later than 30 days prior to the start of construction of any of the activities authorized by this permit.

d. The permittee shall provide two complete sets of as-builts of the completed work within the mitigation areas to the Corps of Engineers. The as-builts shall indicate any changes made from the original plans in red ink. These as-builts shall be provided no later than 60 days after the completion of mitigation area wetland construction.

e. Monitoring of the vernal pool and freshwater marsh mitigation areas shall occur for five years or until the success criteria described in the Wetland Mitigation Plan for the Revised Natomas Area Flood Control Improvement Project are met, whichever is longer. This period shall commence upon completion of the construction of the mitigation wetlands. Additionally, continued success of the mitigation wetlands, without human intervention, must be demonstrated for three consecutive years, once the success criteria have been met. The mitigation will not be deemed successful until this criteria has been met. Monitoring reports shall be submitted annually to the Corps of Engineers, U.S. Environmental Protection Agency, U.S. Fish and Wildlife Service, and the CA Department of Fish and Game for the five year monitoring period, and for each additional year, if needed due to remediation to the mitigation program.

f. Monitoring of riparian mitigation areas shall occur for ten years or until the success criteria described in the incorporated documents describing the mitigation plan are met, whichever is greater. This period shall commence upon completion of the construction of the mitigation wetlands. Additionally continued success of the mitigation wetlands, without human intervention, must be demonstrated for three consecutive years once the success criteria have been met. The mitigation plan will not be deemed successful until this criteria has been met.

Monitoring reports shall be submitted annually for years one through six and for years eight, and ten of the monitoring period, and for each additional year if needed due to remediation to the mitigation areas.

An additional monitoring report shall be provided at the end of the three year period demonstrating continued success of the mitigation program without human intervention. The only exception to this last requirement shall be if the three year period occurs wholly within the ten year monitoring period, in which case the ten year report may be used to meet this requirement.

g. All pumps shall be screened in accordance with the requirements of the California Department of Fish and Game Code.

h. Documentation of all sites potentially eligible for listing in the National Register of Historic Places that would be affected by construction activities shall be accomplished in accordance with standards developed in consultation with the California State Historic Preservation Officer.

i. Prior to initiating any construction on the pump station north of Dry Creek, a Historic Property Treatment Plan (HPTP) shall be developed and approved in accordance with the Programmatic Agreement Among the Corps of Engineers, Bureau of Reclamation, California State Historic Preservation Officer, and the Advisory Council on Historic Preservation Regarding implementation of the American River Watershed Project.

j. Prior to initiating any construction on the pump station north of Dry Creek, the permittee shall develop a Natomas Basin Habitat Management Plan (Plan). This Plan shall provide the framework within which a mitigation program for the effects of development within the Natomas floodplain will proceed. The framework shall be incorporated into future planning processes by State, local, and Federal authorities as development reaches the appropriate planning stages. The plan shall: ensure that the development within the Natomas floodplain complies with applicable Federal, State and local laws and regulations, including the Endangered Species Act and the Clean Water Act; identify at a conceptual level, appropriate and practicable mitigation measures that may be contemplated under Federal, State, and local laws pertaining to future development; and describe the mechanism to be used for the long-term management and protection of any mitigation lands. The Plan shall be developed by the permittee in coordination with the on-going Corps of Engineers activities for the American River Watershed Investigation. The Plan, including its development, shall be coordinated with the Corps, the U.S. Fish and Wildlife Service, the Environmental Protection Agency, and other Federal, State, and local agencies having interest, expertise and jurisdiction over the Natomas floodplain.

The District Engineer will verify that the Final Plan is in compliance with this condition before work commences on the pump station. The final Plan shall be incorporated by reference as a condition of this permit. Enforcement of mitigation requirements of State and local land use agencies shall be the responsibility of the applicable State or local agency.

k. The applicant shall prepare and implement a plan for avoiding and minimizing construction related impacts to the giant garter snake. The plan shall be submitted to the Corps and Service for review and approval prior to the start of project construction.

l. The permit applicant shall not begin construction on the pumping station along the East Main Drain or otherwise complete the proposed project by providing 100-year flood protection for the lower American Basin until the Service first issues an incidental take permit and associated implementing agreement pursuant to Section 10(a)(1)(b) of the Act to the City and County of Sacramento, Sutter County and any other parties necessary to guarantee the successful implementation of a habitat conservation plan for the giant garter snake resident in the American Basin. This plan shall be compatible with and a component of the multispecies habitat management plan otherwise required by the Department of the Army as a condition of permit authorization.

m. The Biological Opinion from the U.S. Fish and Wildlife Service to the U.S. Army Corps of Engineers dated March 11, 1994 is expressly incorporated as a condition of this permit.

Further Information:

1. Congressional Authorities: You have been authorized to undertake the activity described above pursuant to:

() Section 10 of the Rivers and Harbors Act of 1899 (33 U.S.C. 403).

(X) Section 404 of the Clean Water Act (33 U.S.C. 1344).

() Section 103 of the Marine Protection, Research and Sanctuaries Act of 1972 (33 U.S.C. 1413).

2. Limits of this authorization.

- a. This permit does not obviate the need to obtain other Federal, state, or local authorizations required by law.
- b. This permit does not grant any property rights or exclusive privileges.
- c. This permit does not authorize any injury to the property or rights of others.
- d. This permit does not authorize interference with any existing or proposed Federal projects.

3. Limits of Federal Liability. In issuing this permit, the Federal Government does not assume any liability for the following:

- a. Damages to the permitted project or uses thereof as a result of other permitted or unpermitted activities or from natural causes.
- b. Damages to the permitted project or uses thereof as a result of current or future activities undertaken by or on behalf of the United States in the public interest.
- c. Damages to persons, property, or to other permitted or unpermitted activities or structures caused by the activity authorized by this permit.
- d. Design or construction deficiencies associated with the permitted work.
- e. Damage claims associated with any future modification, suspension, or revocation of this permit.

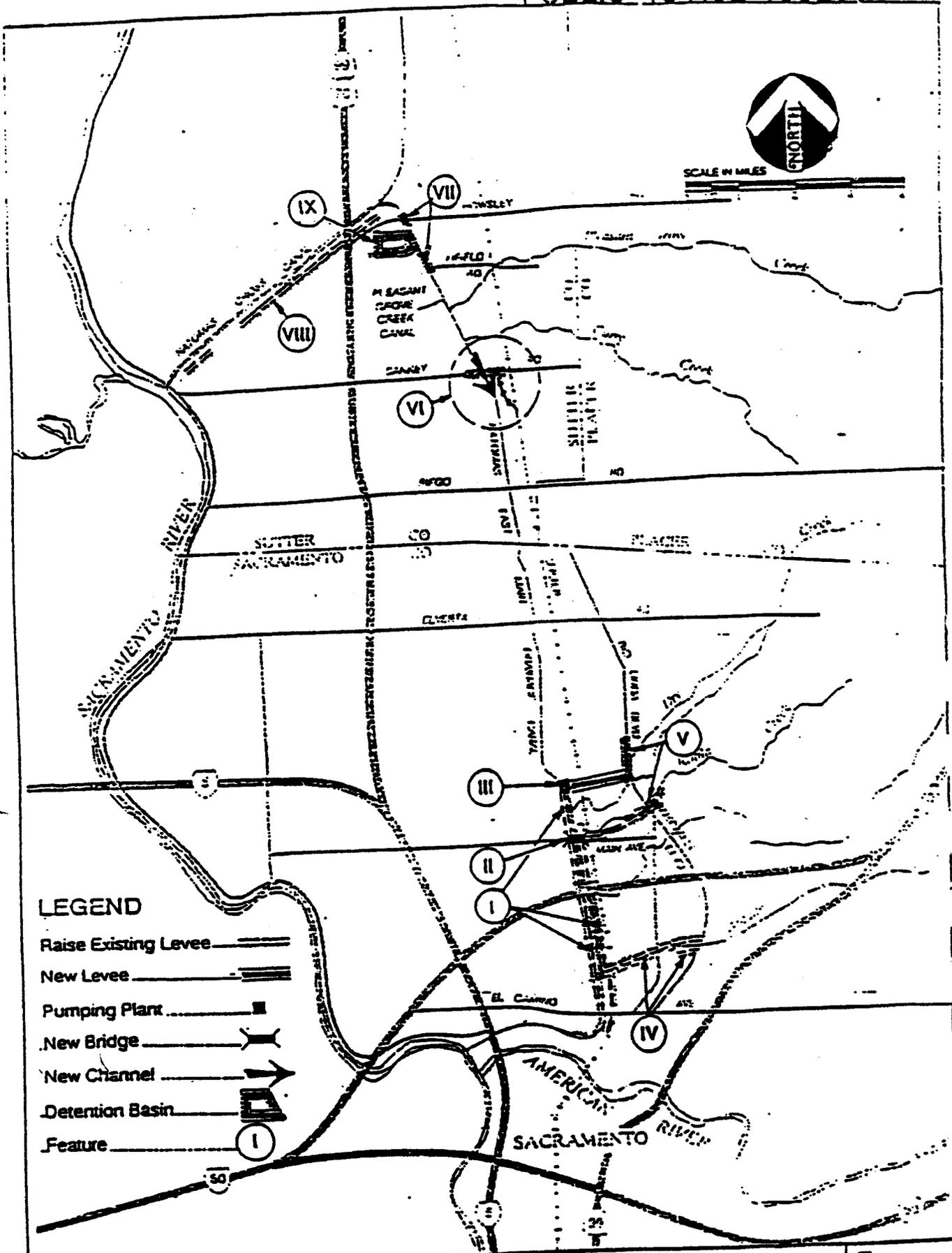
4. Reliance on Applicant's Data. The determination of this office that issuance of this permit is not contrary to the public interest was made in reliance on the information you provided.

5. Reevaluation of Permit Decision. This office may reevaluate its decision on this permit at any time the circumstances warrant.

Circumstances that could require a reevaluation include, but are not limited to, the following:

- a. You fail to comply with the terms and conditions of this permit.
- b. The information provided by you in support of your permit application proves to have been false, incomplete, or inaccurate (see 4 above).
- c. Significant new information surfaces which this office did not consider in reaching the original public interest decision.

Such a reevaluation may result in a determination that it is appropriate to use the suspension, modification, and revocation procedures contained in 33 CFR 325.7 or enforcement procedures such as those contained in 33 CFR 326.4 and 326.5. The referenced enforcement procedures provide for the issuance of an administrative



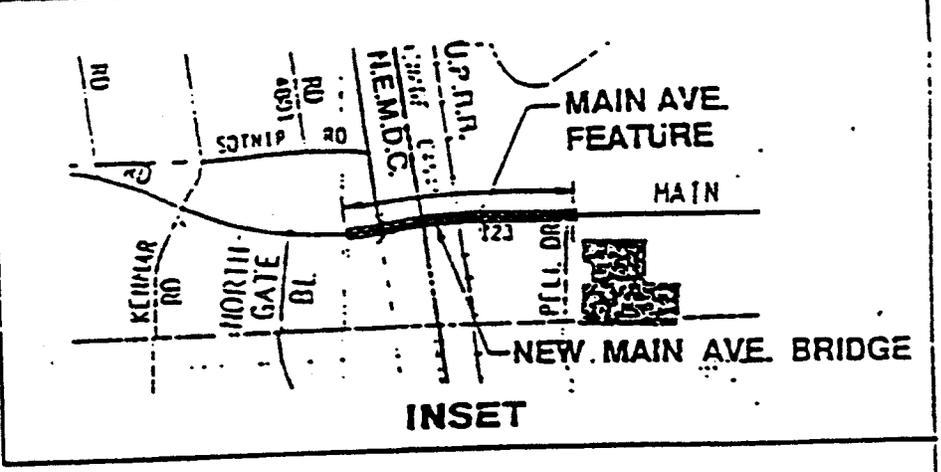
- LEGEND**
- Raise Existing Levee
 - New Levee
 - Pumping Plant
 - New Bridge
 - New Channel
 - Detention Basin
 - Feature

SAFCA LOCAL PROJECT

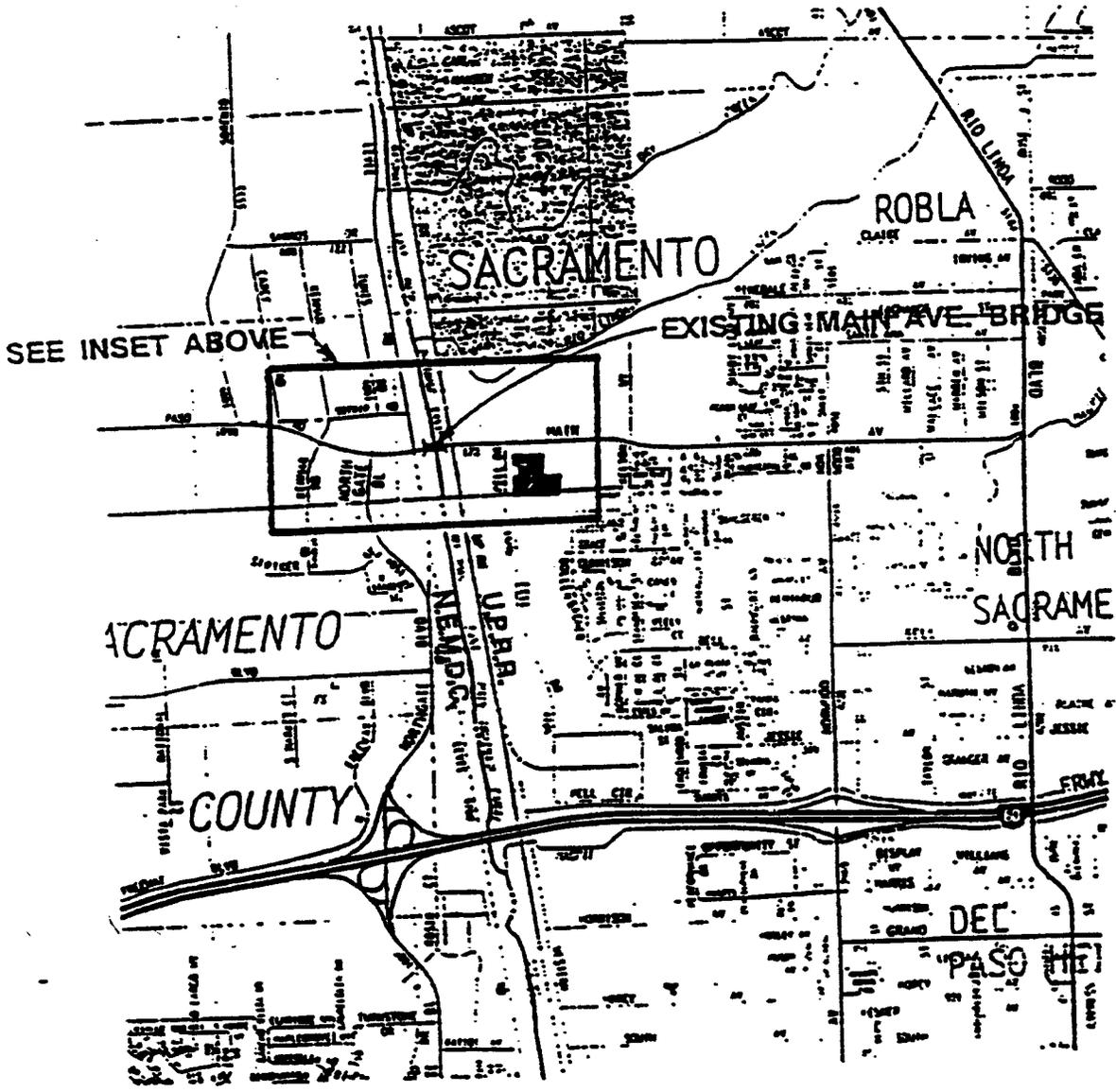
NATOMAS AREA FLOOD CONTROL

Figure

2



INSET

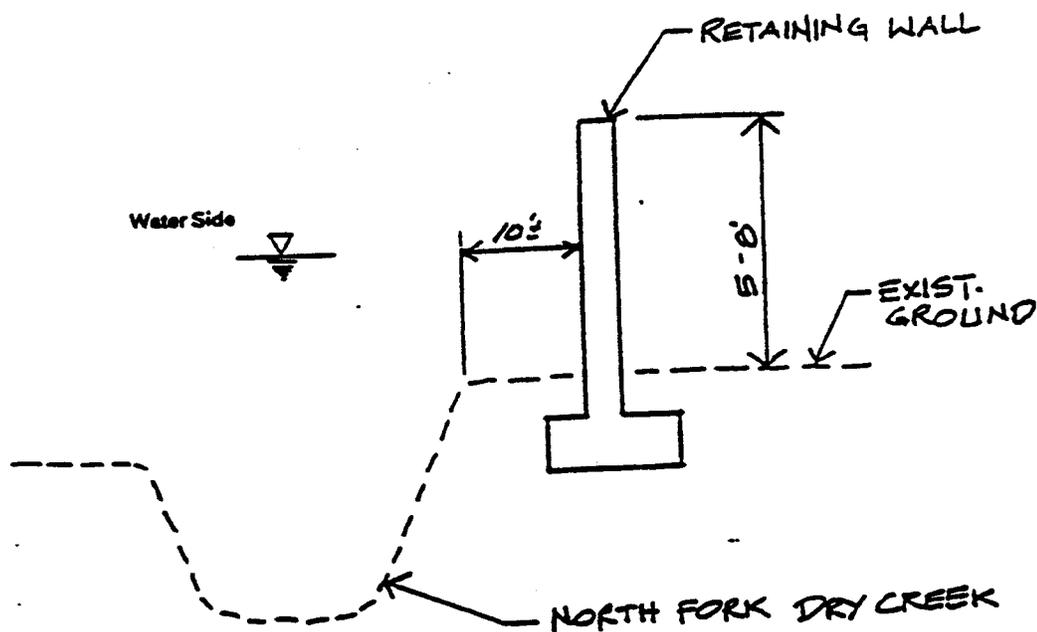
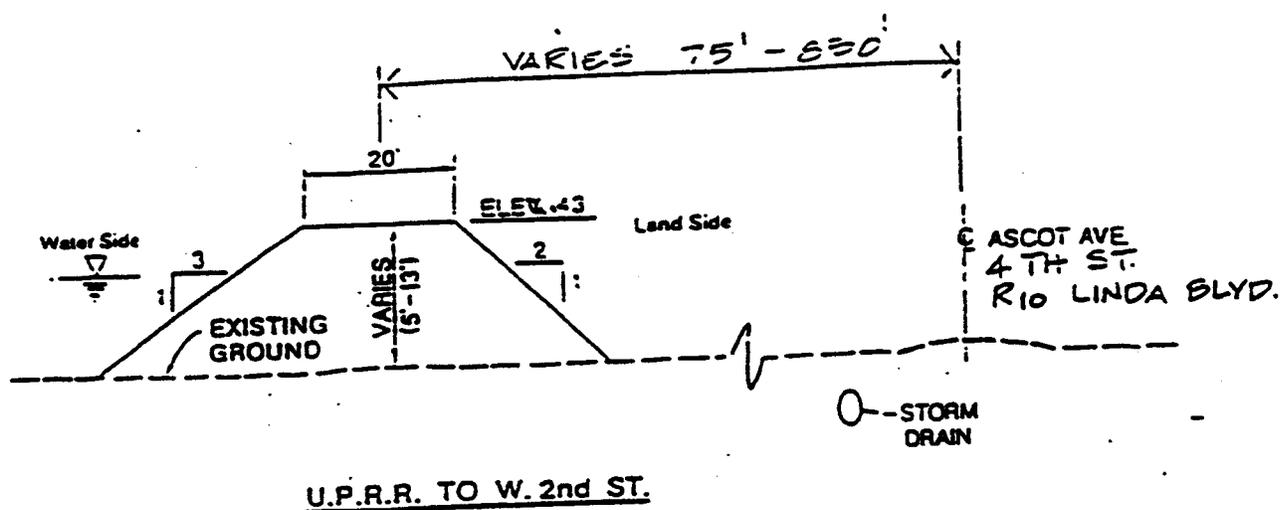


SEE INSET ABOVE

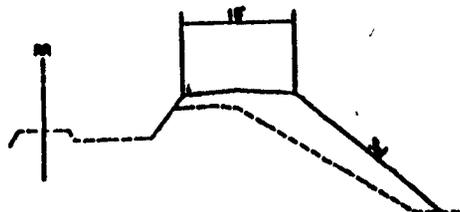
Parsons
Brinckerhoff 100
YEARS

SAFCA LOCAL PROJECT
MAIN AVE. BRIDGE
VICINITY / LOCATION MAP

Figure
5

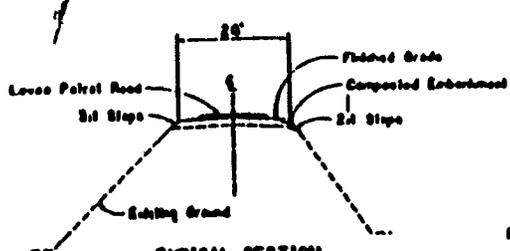


TYPICAL SECTION - DRY CREEK FLOOD WALL
 STA. 73+20 TO 79+65
 STA. 85+00 TO 89+25

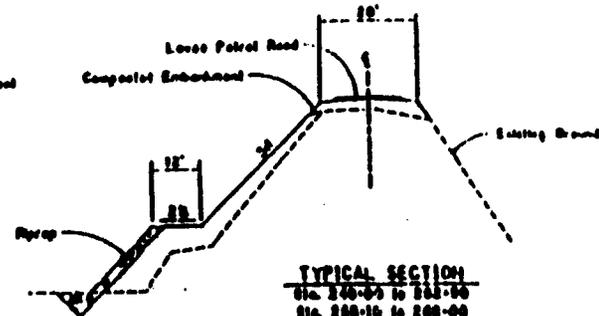


TYPICAL SECTION
Station 131+00 to 133+00

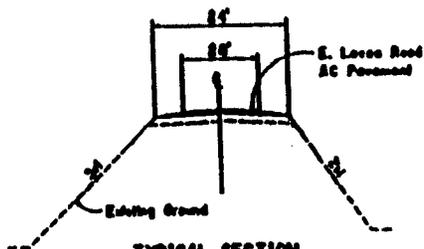
EAST LEVEL



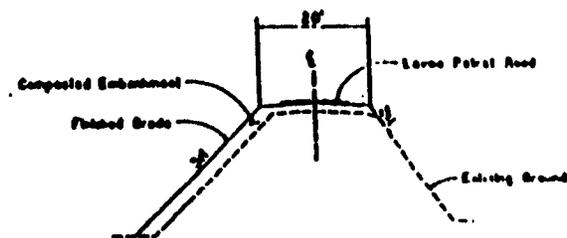
TYPICAL SECTION
Sta. 134+00 to 137+00



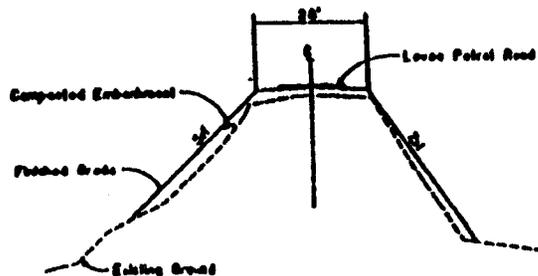
TYPICAL SECTION
Sta. 140+00 to 143+00
Sta. 144+10 to 146+00



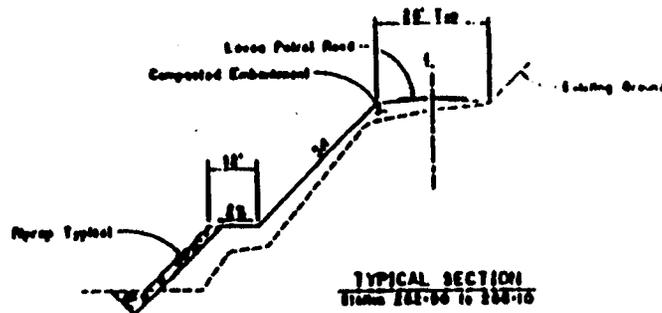
TYPICAL SECTION
Sta. 148+00 to 149+00



TYPICAL SECTION
Station 154+00 to 174+00
Station 179+00 to 181+00
Station 181+00 to 184+00
Station 184+00 to 194+10
Station 194+00 to 212+00



TYPICAL SECTION
Station 178+00 to 179+00

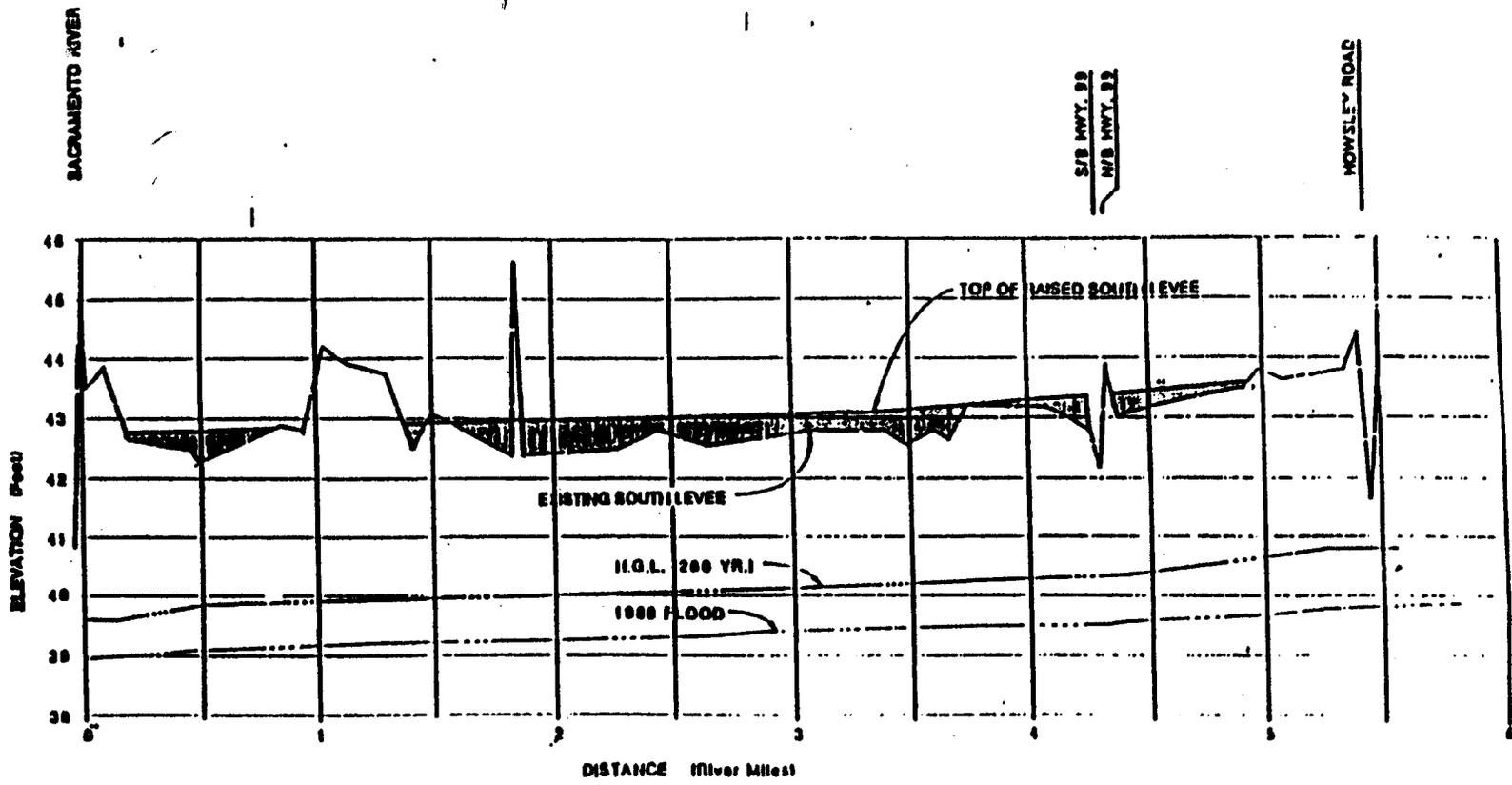


TYPICAL SECTION
Station 211+00 to 212+10

WEST LEVEL

PUBLIC NOTICE 199200/19

SACRAMENTO AREA FLOOD CONTROL AGENCY NEMDC LEVEE PROJECT TYPICAL LEVEE CROSS SECTIONS		100' 10" 4
PROJECT NO. SA DRAWING NO. SA DATE 8-00-00	PREPARED BY CHECKED BY DATE	100' 10" 4



PUBLIC NOTICE 199200719

NOTE:

Topography is based on Corps of Engineers information contained in the American River Watershed Investigation: Final Study Report, (December 1991) and augmented by field surveys, conducted by Parsons Brinckerhoff (in summer 1992).

H.G.L. (200 YR) is based on Parsons Brinckerhoff hydrologic analysis using CQJ adopted here.

DEPARTMENT OF FISH AND GAME

REGION 2

1701 NIMBUS ROAD, SUITE A
MCHO CORDOVA, CA 95670

(916) 355-7020



May 3, 1995

Colonel John N. Reese
District Engineer
US Army Corps of Engineers
1325 J Street
Sacramento, California 95814

Dear Colonel Reese:

The Department of Fish and Game recently received a copy of a letter from Mr. Butch Hodgkins of the Sacramento Area Flood Control Agency (SAFCA) regarding Permit No. 199200719 with a request for changes to two of the conditions.

These changes would require that the Habitat Conservation Plan (HCP) be completed and approved prior to the completion of the construction of the pump station rather than prior to commencement of construction. The original requirement was designed to facilitate the expeditious preparation of the HCP so that the indirect effects of the flood control project would be mitigated.

At this point in time, we would ask that you postpone your decision on this request. Currently, SAFCA, the City of Sacramento, and Sacramento and Sutter counties are expected to approve submittal of the HCP on July 18, 1995, prior to August when SAFCA needs to award the contract for the pump station. While we fully expect the HCP to be submitted on July 18, there has been some opposition to the overall concept of an HCP by some members of the public.

Our recommendation regarding the request for changes in the permit condition will depend, in part, on the actions by the various boards and councils on July 18. This delay in a decision should not prejudice SAFCA's proposed project because the contract wouldn't be awarded until August and it will allow us to better gauge the likelihood of success in the efforts to prepare an HCP.

Colonel John N. Reese
May 3, 1995
Page Two

If you have any questions, please contact myself at
(916) 355-0922, or Ms. Cindy Chadwick, Environmental Services
Supervisor, at (916) 355-0267.

Sincerely,


for L. Ryan Broddrick
Regional Manager

cc: Ms. Cindy Chadwick
Department of Fish and Game
Rancho Cordova, California

Mr. Wayne White
U.S. Fish and Wildlife Service
2800 Cottage Way, Room E-1803
Sacramento, California 95825

Mr. Butch Hodgkins
Sacramento Area Flood
Control Agency
926 J Street, Suite 424
Sacramento, California 95816

Copy Furnished:

U.S. Fish and Wildlife Service, Attn: Joel Medlin,
2800 Cottage Way, Room E-1803, Sacramento, California 95825
The Honorable Vic Fazio, Representative in Congress,
3rd District, California, 2113 Rayburn, Post Office Building,
Washington, D.C. 20515
The Honorable Robert T. Matsui, Representative in Congress,
5th District, California, 2311 Rayburn, Post Office Building,
Washington, D.C. 20515
The Honorable John T. Doolittle, Representative in Congress,
4th District, California, 2130 Professional Drive, Suite 190,
Roseville, California 95661
The Honorable Richard W. Pombo, Representative in Congress,
11th District, California, 1519 Longworth, House Office
Building, Washington, D.C. 20515
The Bohl Corporation, Attn: John A. Bohl, 1330 "Q" Street,
Sacramento, California 95814
Law Offices Of Gregory D. Thatch, Attn: Gregory D. Thatch,
1730 I Street, Suite 220, Sacramento, California 95814



DEPARTMENT OF THE ARMY
U.S. ARMY ENGINEER DISTRICT, SACRAMENTO
CORPS OF ENGINEERS
1325 J STREET
SACRAMENTO, CALIFORNIA 95814-2922

REPLY TO
ATTENTION OF

May 5, 1995

Regulatory Branch (199200719)

F.I. Hodgkins, Executive Director
Sacramento Area Flood Control Agency
926 J Street, Suite 424
Sacramento, California 95814

Dear Mr. Hodgkins:

In response to your letter of April 19, 1995, we have modified Special Conditions i, j, and l of Department of the Army Permit number 199200719. These conditions have been modified as follows:

For purposes of these three conditions "complete construction" shall mean the placement of the embankment from the pump station east to the Union Pacific railroad tracks.

i. Prior to completing construction on the pump station north of Dry Creek, a Historic Property Treatment Plan (HPTP) shall be developed and approved in accordance with the Programmatic Agreement Among the Corps of Engineers, Bureau of Reclamation, California State Historic Preservation Officer, and the Advisory Council on Historic Preservation Regarding implementation of the American River Watershed Project.

j. Prior to completing construction on the pump station north of Dry Creek, the permittee shall develop a Natomas Basin Habitat Management Plan (Plan). This Plan shall provide the framework within which a mitigation program for the effects of development within the Natomas floodplain will proceed. The framework shall be incorporated into future planning processes by State, local, and Federal authorities as development reaches the appropriate planning stages. The plan shall: ensure that the development within the Natomas floodplain complies with applicable Federal, State and local laws and regulations, including the Endangered Species Act and the Clean Water Act; identify at a conceptual level, appropriate and practicable mitigation measures that may be contemplated under Federal, State, and local laws pertaining to future development; and describe the mechanism to be used for the long-term management and protection of any mitigation lands.

The Plan shall be developed by the permittee in coordination with the on-going Corps of Engineers activities for the American River Watershed Investigation. The Plan, including its development, shall be coordinated with the Corps, the U.S. Fish and Wildlife Service, the Environmental Protection Agency, and other Federal, State, and local agencies having interest, expertise and jurisdiction over the Natomas floodplain.

The District Engineer will verify that the Final Plan is in compliance with this condition before completing construction on the pump station. The final Plan shall be incorporated by reference as a condition of this permit. Enforcement of mitigation requirements of State and local land use agencies shall be the responsibility of the applicable State or local agency.

1. The permit applicant shall not complete construction on the pumping station along the East Main Drain or otherwise complete the proposed project by providing 100-year flood protection for the lower American Basin until the Service first issues an incidental take permit and associated implementing agreement pursuant to Section 10(a)(1)(b) of the Act to the City and County of Sacramento, Sutter County and any other parties necessary to guarantee the successful implementation of a habitat conservation plan for the giant garter snake resident in the American Basin. This plan shall be compatible with and a component of the multispecies habitat management plan otherwise required by the Department of the Army as a condition of permit authorization.

All other conditions of the permit remain in full force and effect.

If you have any questions, please write to Tom Cavanaugh, Room 1444, or telephone (916) 557-5261.

Sincerely,



John N. Reese
Colonel, Corps of Engineers
District Engineer



United States Department of the Interior

FISH AND WILDLIFE SERVICE
Ecological Services
Sacramento Field Office
2800 Cottage Way, Room E-1803
Sacramento, California 95825-1846

IN REPLY REFER TO:

In Reply Refer To:
1-1-95-I-900

May 19, 1995

Colonel John Reese
District Engineer
U.S. Army Corps of Engineers
1325 J Street
Sacramento, California 95814-2922

Subject: Endangered Species Act Consultation on the Revised Natomas Area Flood Control Improvement Project (PN 199200719, 1-1-94-F-13) in Sacramento and Sutter Counties, California

Dear Colonel Reese:

This letter is in response to the April 19, 1995, letter from the Sacramento Area Flood Control Agency to your office regarding modifications to the above mentioned Army Corps of Engineers (Corps) permit, and your May 5, 1995, response. At issue are similar provisions of the Corps permit and the March 11, 1994, biological opinion prepared pursuant to section 7 of the Endangered Species Act of 1973, as amended (Act), requiring that construction of the pumping station along the East Main Drain not be initiated until the applicants obtain a permit pursuant to section 10(a)(1)(B) of the Act. Since issuance of the biological opinion, the applicants have made substantial progress toward completing the section 10(a)(1)(B) process. To date, the applicants have submitted a draft Habitat Conservation Plan (HCP) that my staff has reviewed. We have determined that, with minor additions to provide clarification, this draft will be acceptable in principle. At this time my staff is working with the applicants to complete the HCP process.

It has come to our attention, however, that to meet timing needs, the applicants must initiate construction on the pumping station prior to completion of the section 10(a)(1)(B) process. To aid the local community in this matter, we are modifying term and condition 2) of the biological opinion to read as follows:

The Sacramento Area Flood Control Agency shall not commence construction of the pumping station along the East Main Drain until it and any other necessary parties have submitted to the Service an application for an incidental take permit pursuant to section 10(a)(1)(B) of the Act accompanied by an Habitat Conservation Plan and Implementing Agreement for the giant garter snake that have been conceptually agreed to by the Service. This plan will be compatible with and a component of the multi-species habitat management plan otherwise required by the Corps as a condition of permit authorization. The permit applicants shall not complete construction of the pumping station or otherwise complete the proposed project until the Service issues the subject section 10(a)(1)(B) permit. For purposes of this condition, "complete construction" shall mean the placement of the embankment from the pump station east to the Union Pacific railroad tracks.

This modification will allow the applicants to initiate construction activities, thus alleviating their concerns.



United States Department of the Interior

FISH AND WILDLIFE SERVICE
Ecological Services
Sacramento Field Office
2800 Cottage Way, Room E-1803
Sacramento, California 95825-1846

In Reply Refer To:
1-1:94-F-13

March 11, 1994

District Engineer
U.S. Army Corps of Engineers
Regulatory Branch (Attention: Tom Kavanaugh)
1325 J Street
Sacramento, California 95814-2922

Subject: Endangered Species Act Consultation on the Revised Natomas Area Flood Control Improvement Project (PN 199200719) in Sacramento and Sutter Counties, California

Dear Sir:

This responds to your request of January 21, 1994, for initiation of formal consultation pursuant to section 7 of the Endangered Species Act of 1973, as amended (Act), on the proposed provision of 200-year flood protection for the lower American Basin. Your request was received by the U.S. Fish and Wildlife Service (Service) on January 25, 1994. At issue are the effects of the proposed project on the giant garter snake (*Thamnophis gigas*), listed as a threatened species by the State and Federal governments.

This biological opinion is based on the public notice for this project, numerous environmental documents prepared under the National Environmental Policy Act and California Environmental Quality Act, and other scientific and commercial information in Service files.

Biological Opinion

It is our biological opinion that the proposed Revised Natomas Area Flood Control Improvement Project, together with the five proposed permit conditions described in the Corps' letter dated January 21, 1994, is not likely to jeopardize the continued existence of the giant garter snake. Critical habitat has not been designated for this species; therefore, none will be adversely modified or destroyed.

Description of the Proposed Action

Please refer to the public notice (PN 199200719) for a description of the construction related details of the proposed project. In brief, the Sacramento Area Flood Control Agency (SAFCA) proposes to improve levee systems needed to provide 200-year flood protection to the 55,000-acre lower American

(Natomas) Basin. Your January 21, 1994, request for consultation included a list of five special conditions proposed for inclusion as part of any permit issued for the proposed project--three conditions designed to avoid, minimize, and offset the direct effects of project construction on the garter snake, and two conditions that would offset the indirect effects of the proposed flood control project. By mutual agreement, the Corps and Service consider these permit conditions to be part of the project proposal. Please refer to the Incidental Take section below for more details on conditional language to be included in any Department of the Army authorization of the proposed project.

To avoid, minimize, and offset the direct effects of the proposed project on the giant garter snake, the Corps proposed three permit conditions to supplement the applicant's proposed Wetland Mitigation Plan, dated June 1993. These three permit conditions, as described by letter dated January 21, 1994, would (1) require preconstruction surveys for the giant garter snake, (2) include measures to minimize the extent of incidental take, and (3) compensate for any direct losses of giant garter snake habitat. To address indirect effects of the proposed project, the Corps also proposed (in the same letter) to require (4) completion of a habitat management plan prior to start of construction of the proposed pumping station, per direction of the Assistant Secretary of the Army (Civil Works), that addresses mitigation requirements for the giant garter snake, and (5) inclusion of a habitat management plan and signed agreement among the City of Sacramento, Sacramento and Sutter counties, and the Service, to guarantee implementation of the plan. Relative to items #1 and 2 above, the permit applicant, by letter dated February 3, 1994, submitted a proposed plan to avoid direct effects of project construction on the giant garter snake. This plan will be modified and approved by the Service per requirements described in the Incidental Take section below.

Species Account/Environmental Baseline

Please refer to the October 20, 1993, Federal Register notice (58 FR 54053-54066) listing the giant garter snake as a threatened species, for detailed information on the biology/ecology of the species. One of the largest garter snakes, reaching a total length of at least 64 inches, this highly aquatic species feeds exclusively on small fishes, tadpoles, and frogs. The giant garter snake inhabits small mammal burrows and other soil orifices above prevailing flood elevations throughout its winter dormancy period (November to mid-March). The breeding season commences immediately upon emergence in the spring, extending through March and April; females give birth to live young from late July through early September (Hansen and Hansen 1990). Brood size is variable, ranging from 10 to 46 young, with a mean of 23.1 (n=19) (*ibid.*). Although growth rates are variable, young typically more than double in size by one year of age (*ibid.*). Sexual maturity averages 3 years of age in males and 5 years for females (*ibid.*).

The giant garter snake is endemic to valley floor emergent marshes in the Central Valley, historically distributed throughout the large flood basins from the former Buena Vista lakebed in Kern County northward to the Butte Basin. Reclamation of wetlands for agriculture and flood control have resulted in severe habitat fragmentation, to the extent that wetland habitats with natural hydrologic and vegetative characteristics effectively have been eliminated throughout the entire range of the species. The remaining giant garter snake populations identified since the mid-1970s are clustered in 13

distinct areas that largely coincide with historical riverine flood basins and tributary streams (Hinds 1952, Brode and Hansen 1992). In agricultural areas (predominantly rice), giant garter snakes primarily occur along water delivery and drainage canals. Nine of the remaining 13 regional populations occur discontinuously in typically small, isolated patches of valley floor habitat that support few individuals due to limited extent and quality of suitable habitat (Hansen 1988). These nine populations, encompassing about 75 percent of the species' current geographic range, are vulnerable to extinction at any time from anthropogenic causes, as well as stochastic (random) environmental, demographic, and genetic processes. Despite repeated censusing, giant garter snakes have not been observed throughout the San Joaquin Valley since the mid-1970's. Considering the urbanization threats to the American Basin population portended by the proposed project, 10 of the 13 (77 percent) extant populations are imminently imperiled.

The American Basin supports the largest extant giant garter snake population (Brode and Hansen 1992). Throughout this area, reconnaissance level surveys (USFWS 1991) indicate that about 1,400 acres of giant garter snake habitat exist in the form of man-made irrigation and drainage canals, as well as an undetermined acreage of suitable habitat within nearly 13,000 acres of adjoining rice fields. The giant garter snake also uses an undetermined amount of habitat at higher elevations to escape from winter flooding during the inactive winter phase of the snake's life cycle.

Effects of the Proposed Action

Direct Effects

The proposed levee improvement work could directly affect giant garter snakes if they occur along the reaches specified for upgrading. The applicant proposes to conduct field surveys to determine if suitable habitat and the species occur in any of the proposed work areas. If giant garter snakes are found, construction will be scheduled to avoid the period between October 1 to May 1, thereby precluding the likelihood of impacting snakes while dormant underground. Levee construction will predominantly occur along levee tops and banks, areas seldom used by this highly aquatic species during its active season. Therefore, death or injury from construction activities during the summer along levee banks and slopes is unlikely because snakes center their activities in aquatic habitats at this time.

Nonetheless, as currently formulated, the proposed levee improvements do not address the possibility of eliminating terrestrial retreat habitat during the summer while garter snakes are restricted largely to aquatic habitats. Under this scenario, terrestrial retreat habitat may become a limiting factor to any garter snakes inhabiting project reaches scheduled for levee improvement. However, it is likely that small mammals and other processes that create soil holes and fissures will relatively quickly reestablish any terrestrial retreat habitat lost due to project construction.

Indirect Effects

The proposed flood control project would provide 200-year flood protection for the 55,000-acre lower American Basin. This area currently consists 7,140 of acres of urban land uses and 47,742 acres of agricultural lands. The draft

and final Environmental Impact Statement (EIS) for the American River Watershed Investigation (U.S. Army Corps of Engineers 1991); and Environmental Impact Report (EIR) for the Revised Natomas Area Flood Control Improvement Project (SAFCA 1993) defined this 55,000-acre basin as the project area. Both documents acknowledged that flood control would result in intensive urbanization of the Basin throughout the foreseeable future. In addition, various City and County plans identify proposed development for the region, to wit: draft EIR for the Sutter Bay Village Specific Plan and Golf Course Residential (Sutter County 1992); draft EIR for the Metropolitan Airport/Vicinity Special Planning Area General Plan Amendment and Rezone No. 89-GPB-ZOB-0781 (Sacramento County 1992); North Natomas Community Plan (City of Sacramento 1993); draft and final EIR's for the South Sutter County General Plan Amendment (Sutter County 1991, 1992). These documents establish a clear link between the proposed flood protection and resulting flood plain development. For example, the North Natomas Community Plan acknowledges that further development is precluded until the proposed flood control project is constructed. The Sutter Bay Village Specific Plan states that "[u]ltimate approval of the proposed project (Sutter Bay) is dependent on the eventual approval of a regional flood control project, which is being proposed by the Sacramento Area Flood Control Agency, the Army Corps of Engineers, and the State Reclamation Board." Moreover, Joe Serna, Mayor of the City of Sacramento, stated at a September 16, 1993, meeting of the Floodplain Management Association, that "the decision already has been made in Natomas, we're going to develop it" (Sacramento Bee, 9/17/93).

Absent measures to address the prospect of future basin-wide losses of existing giant garter snake habitat, this flood control project and consequent urban development could extirpate the giant garter snake from the American Basin [California Department of Fish and Game (CDFG) 1992, Brode and Hansen 1992)]. The North Natomas Community Drainage System and associated urban development, proposed by the City of Sacramento, would affect about 26 miles of giant garter snake habitat along existing canals and ditches, and additional rice field habitat (*ibid.*). Potential effectiveness of a proposed mitigation plan remains undetermined. The proposed Sutter Bay project, at the north end of the American Basin, could eliminate and/or degrade about 42 miles of suitable canals (*ibid.*) and thousands of acres of associated rice fields and giant garter snake habitat. The proposed South Sutter Industrial Center, located near the Sutter Bay project, could eliminate another 9.0 miles of aquatic habitat and associated rice fields. The Metro Air Park is proposing about 1,890 acres of development on agricultural and vacant lands that potentially could result in major adverse impacts to the species, including the loss of about 9.0 miles of canal habitat and 1,500 acres of rice fields, as well as the disruption of movement corridors (*ibid.*). Roadway improvement and construction projects, or the planned extension of the Sacramento Regional Transit system in this area, also increases the likelihood for major impacts to the species, including elevated mortality from increased traffic on local roads and highways (*ibid.*). Numerous species of aquatic snakes are vulnerable to roadway mortality (Bernardino et al. 1992). Giant garter snakes also are killed and injured by vehicular traffic, as evinced by numerous observations (Sacramento County 1992; G. Hansen, pers. comm., 1992; J. Brode, pers. comm., 1992); of the cumulative total of 1,056 giant garter snake records compiled by G. Hansen over his many years of study, 76 (7.2 percent) were road kills (G. Hansen, pers. comm., 1992).

With nine of the twelve other extant populations on the verge of extinction throughout 75 percent of the current range of the species, including the entire San Joaquin Valley (see Species Account/Environmental Baseline), survival of the species cannot be assured by the additional loss or degradation of the largest remaining population. Because of the severe, declining trends in habitat suitability/availability and population levels throughout 75 percent of the range of the species, the Service concludes that the maintenance of a viable giant garter snake population in the American Basin is vital to the survival of the species.

To address the prospective habitat losses of the proposed project to the American Basin population, the Corps has proposed, by letter dated January 21, 1994, a special permit condition that would establish a multispecies habitat management plan for the 55,000-acre lower American Basin, scheduled for completion prior to the start of construction of the proposed pumping station. An element of this habitat management plan would include an agreement among local governments and the Service that guarantees the conservation needs of the giant garter snake. Based on ongoing habitat conservation planning discussions with representatives of the applicant, Corps, CDFG, and landowners, this agreement, at the Federal level, will take the form of an incidental take permit and implementing agreement issued by the Service under section 10(a)(1)(B) of the Act, and at the State level, a permit issued by the CDFG under section 2081 of the State Fish and Game Code.

This habitat management plan would provide certainty for the maintenance of a viable population in the American Basin if the proposed project is authorized. The Service, therefore, concludes that the proposed project is not expected to reduce appreciably the likelihood of the survival and recovery of the giant garter snake by adversely affecting reproduction, numbers, and distribution of the species.

Cumulative Effects

Cumulative effects are those effects of future non-Federal (State and local governments, or private) activities on endangered and threatened species or critical habitat that are reasonably certain to occur during the course of the Federal activity subject to consultation. Future Federal actions are subject to the consultation requirements established in section 7 and, therefore, are not considered cumulative to the proposed action.

Various farming and canal maintenance practices adversely affect most remaining giant garter snake populations (58 FR 54063). For example, sodium sulfate and selenium contamination throughout most of the Grasslands region of the San Joaquin Valley has been documented to adversely affect giant garter snake prey species and overall habitat quality (USFWS file information). In addition, acrolein (Magnacide H) is commonly used as a herbicide in irrigation and drainage canals throughout much of the range of the giant garter snake. This compound, when used at levels needed to control target plant species, is toxic to virtually all aquatic vertebrates (CDFG and USFWS file information). Livestock grazing is known to be contributing to the elimination and degradation of available habitat at four populations (58 FR 54061).

Cumulative effects together with the impacts of the proposed project are not likely to reduce appreciably the likelihood of the survival and recovery of the giant garter snake.

Incidental Take

Sections 4(d) and 9 of the Act, as amended, prohibit any taking (harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or attempt to engage in any such conduct) of listed species of fish or wildlife without special exemption. Harm is further defined to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing behavioral patterns such as breeding, feeding, or sheltering. Harass is defined as actions that create the likelihood of injury to such an extent as to significantly disrupt normal behavioral patterns that include but are not limited to breeding, feeding, or sheltering.

Under the terms of §7(b)(4) and §7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered a prohibited taking provided that such take is in compliance with this incidental take statement. The measures described below are nondiscretionary and must be undertaken by the agency so that they become binding conditions of any permit issued to the applicant for the exemption in §7(o)(2) to apply. The Federal agency has a continuing duty to regulate the activity that is covered by this incidental take statement. If the agency fails to require the applicant to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit, the protective coverage of §7(o)(2) may lapse.

The Service anticipates that an unquantified amount of potential giant garter snake habitat could be lost during construction of the proposed levee improvements. Surveys have not been conducted to determine the extent, if any, of giant garter snake habitat within the project reaches proposed for improvement. The Corps and applicant propose preconstruction surveys to obtain the information needed to design and schedule the project so that impacts can be avoided and minimized to the extent possible. The Service also anticipates that an unquantifiable amount of giant garter snake habitat would be eliminated by future commercial development over the next ±50 years throughout much of the lower American Basin consequent to the provision of the proposed flood protection.

The Service establishes the following reasonable and prudent measures to minimize the impact of take. The measures below are nondiscretionary and must be undertaken by the Corps:

- 1) Construction related disturbance to the giant garter snake shall be minimized.
- 2) A conservation plan to address indirect effects of the proposed project shall be approved by the Service prior to the start of construction on the pumping station.

To be exempt from the prohibitions of section 9 of the Act, the following terms and conditions, which implement the reasonable and prudent measures described above, must be complied with in their entirety and included as

special conditions in any Department of the Army permit issued for the proposed project:

- 1) The applicant shall prepare and implement a plan for avoiding and minimizing construction related impacts to the giant garter snake. The plan shall be submitted to the Corps and Service for review and approval prior to the start of project construction.
- 2) The permit applicant shall not begin construction on the pumping station along the East Main Drain or otherwise complete the proposed project by providing 100-year flood protection for the lower American Basin until the Service first issues an incidental take permit and associated implementing agreement pursuant to §10(a)(1)(B) of the Act to the City and County of Sacramento, Sutter County, and any other parties necessary to guarantee the successful implementation of a habitat conservation plan for the giant garter snake population resident within the American Basin. This plan shall be compatible with and a component of the multispecies habitat management plan otherwise required by the Department of the Army as a condition of permit authorization.

Pursuant to 50 CFR §402.14(i)(4), if during the course of the action the amount or extent of incidental taking is exceeded, the causative action must cease and the Corps must reinitiate consultation immediately with the Service to avoid violation of section 9 of the Act.

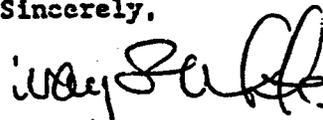
Reporting Requirements: The Service shall be notified immediately of any information about take or suspected take of giant garter snakes associated with project construction and implementation of the habitat conservation plan for the giant garter snake. Upon locating a dead, injured, or sick giant garter snake specimen, the Corps, permittee, and/or contractors must immediately notify the Service within 3 working days of any such information. Notification must include the date, time, and precise location of the incident/specimen, and any other pertinent information. The Service contact for this information is the Field Supervisor at 916/978-4866. Care shall be taken in handling sick or injured specimens to ensure effective treatment and care and in handling dead specimens to preserve biological material in the best possible state for later analysis of cause of death. The finder and handler of any such animals has the responsibility to ensure that evidence intrinsic to the specimen is not unnecessarily disturbed. Injured animals or specimens shall be delivered to the Service's Division of Law Enforcement at 2800 Cottage Way, Sacramento, California 95825-1846 (916/978-4861).

This concludes formal consultation on the project as described above. Reinitiation of formal consultation is required if (1) the amount or extent of incidental take is exceeded, as previously described, or the requirements under the Incidental Take section are not implemented, (2) new information reveals effects of the action that may affect listed species or critical habitat in a manner or to an extent that was not considered in this opinion, (3) the proposed action is subsequently modified in a manner that causes an effect to the giant garter snake that was not considered in this opinion, and/or (4) a new species is listed or critical habitat is designated that may be affected by the action.

The 404 permit expressly incorporates the decision by the Assistant Secretary of the Army (Civil Works), and the biological opinion including accompanying terms and conditions of the incidental take statement provided by the Service. Your May 5, 1995, letter purports to modify the 404 permit in a manner inconsistent with the decision rendered by the Assistant Secretary and the terms and conditions of the biological opinion or the modified language set out above. Consequently, the Service recommends that the Corps either modify the Corps permit conditions to be consistent with the above modified term and condition of biological opinion 1-1-94-F-13, or that we meet at your earliest convenience to resolve this issue.

The Corps also should be aware that the Service is currently working with local entities to develop a procedure that will allow the completion of the proposed flood control project prior to the issuance of a section 10(a)(1)(B) permit. We welcome your participation in these discussions. If you have any questions, please contact Mr Joel Medlin, Field Supervisor, Sacramento Field Office at (916) 979-2710.

Sincerely,



Wayne S. White
State Supervisor

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Appendix K

Addendum to the Biological Technical
Memorandum, prepared by CH2MHill,
April 2003.

Technical Memorandum

Addendum
**Natomas Basin Habitat
Conservation Plan EIR/EIS**

April 2003

CH2MHILL

2485 Natomas Park Drive, Suite 600
Sacramento, California

SECTION 1

Introduction

A Biological Resources Technical Memorandum (CH2M HILL, 2002) was prepared to determine the adequacy of the conservation strategy of the Natomas Basin Habitat Conservation Plan (NBHCP), and to provide a basis for the analysis of impacts in the NBHCP and its Environmental Impact Report/Environmental Impact Statement (EIR/EIS). This Addendum to the Technical Memorandum has been prepared to clarify the original analysis and to support responses to public comments on the Draft NBHCP and Draft EIR/EIS.

This Addendum provides additional information to clarify the baseline habitat conditions for the Swainson's hawk, specifically the quality and availability of foraging opportunities. It also presents clarifying information to refine further the analysis of the effects of the NBHCP on foraging opportunities and the consequent potential effects to the Swainson's hawk population in the Natomas Basin. In addition, it updates the analysis of potential effects of removal of nest trees on the Swainson's hawk population in the Natomas Basin in consideration of implementation of conservation measures to date (CH2M HILL, 2002). The additional information in this Addendum comprises minor revisions to the original analysis conducted for the Draft EIR/EIS and it does not alter the original findings that a less-than-significant impact to Swainson's hawk is anticipated to result from implementing the conservation strategy of the NBHCP. No new or substantially more severe environmental impacts have been identified in the analysis.

The Addendum is organized in the following way:

- Section 1, Introduction
- Section 2, Assumptions and Approach
- Section 3, Additional Information Clarifying Baseline Conditions
- Section 4, Additional Information Clarifying the Effects of Implementing the NBHCP
- Section 5, Conclusions
- Section 6, References

Assumptions and Approach

This section presents the approach and the assumptions used to develop additional information on baseline conditions and the effects of implementing the NBHCP on foraging habitat. Additional baseline information was developed by: (1) quantifying foraging habitat by habitat value and (2) quantifying the temporal availability of foraging opportunities during the months when Swainson's hawks are in the Natomas Basin (April through September). Information that further refines the 2002 Biological Resources Technical Memorandum's determination of the impacts of changes in foraging habitat on Swainson's hawk was developed by evaluating changes in the value and temporal availability of foraging habitat under a range of possible implementation scenarios on the Mitigation Lands (i.e., lands managed by The Natomas Basin Conservancy [TNBC] pursuant to the NBHCP).

2.1 Value of Foraging Habitat

The 2002 Biological Resources Technical Memorandum and Draft EIR/EIS rely on a habitat database to present quantitative information on the acreage of potential Swainson's hawk foraging habitat available in the Natomas Basin (see Tables 4-12 and 4-13 of the Draft EIR/EIS). The habitat database is based on the California Department of Water Resources (DWR) land cover database, which includes information on specific cover types (including crop types) during 1993 for Sacramento County and 1998 for Sutter County. Cover types considered to provide potential foraging habitat for Swainson's hawk are: non-rice crops, pasture, idle, ruderal, grassland, and alfalfa. While the Draft EIR/EIS acknowledges that different cover types offer different value as foraging habitat for Swainson's hawk, differences in estimated habitat values are not quantitatively described. In this manner, the Draft EIR/EIS assumes that all potential foraging habitat provides the same value—a conservative approach because foraging habitat value would not be underestimated.

This Addendum clarifies the prior analysis by classifying foraging habitat from the database (CH2M HILL 2002) as Low, Moderate, or High value using a class system developed by Estep and Teresa (1992). The habitat value classes of Estep and Teresa (1992) reflect differences in prey abundance and accessibility and are derived from a study (Estep 1989) of Swainson's hawk in the Central Valley. Based on the habitat preferences of 12 Swainson's hawks in the Central Valley, agricultural land uses are ranked according to their relative value as foraging habitat from most valuable to least valuable as follows:

- | | |
|---------------------|----------------------|
| 1. Alfalfa | 6. Tomatoes |
| 2. Discd field | 7. Irrigated pasture |
| 3. Fallow | 8. Grains |
| 4. Dry-land pasture | 9. Other row crops |
| 5. Beets | 10. Other |

This ranking reflects differences in prey abundance and accessibility among the cover types. The habitat value rating collapses this ranking into three categories: Low, Moderate, and High.

Table 1 shows the specific crop and pasture types mapped in the Natomas Basin and the corresponding habitat value designation.

TABLE 1

Foraging Habitat Value of Crops, Pasture and Other Cover Types for Swainson's Hawk in the Natomas Basin

Habitat value is based on Estep and Teresa (1992)

Cover Type	Habitat Value	Comment
Non-rice crops		
Sugar beet	Moderate	None
Tomato	Moderate	None
Corn	Low	None
Safflower	Low	None
Onions and garlic	Low	Assigned Low value because a majority of the row and field crops (6 out of 11) listed by Estep and Teresa (1992) are considered Low foraging habitat value. Tall plant structure would impede access to prey.
Melons, squash and cucumber	Moderate	Assigned Moderate value based on similar structure to tomatoes
Beans	Moderate	None
Unspecified row and field crops	Low	Assigned Low value because a majority of the row and field crops (6 out of 11) listed by Estep and Teresa (1992) are assigned Low value.
Wheat	Moderate	None
Pasture		
Alfalfa	High	None
Clover	Moderate	Irrigated pasture in Estep and Teresa (1992)
Unspecified or mixed	Moderate	Irrigated pasture In Estep and Teresa (1992)
Grassland	Moderate	Grassland is assumed to provide Moderate habitat value (Rineck, pers. comm)
Idle	High	Idle fields are considered to be fallow fields under Estep and Teresa's (1992) habitat valuation approach. The Idle classification includes lands not cropped in the current or previous season but cropped in past 3 years. These fields are considered to be "High" value because stubble left after harvest provides forage for rodents and access for hawks. They would not have been idled long enough to allow development of vegetation sufficient to block access to prey by hawks.
Ruderal	Moderate	Ruderal lands are considered similar to fallow fields. Estep and Teresa (1992) show fallow fields as "High" or "Moderate" and note that the value of fallow fields as foraging habitat for Swainson's hawks depends on the height and density of vegetation. Ruderal was used for areas designated as "barren" in the DWR habitat classification. These areas, while not likely to have much vegetation cover, also would not be expected to support abundant prey because of limited vegetation. Therefore, the ruderal designation is considered to be "Moderate" rather than "High."

2.2 Temporal Availability of Foraging Opportunities

Bechard (1982) and Estep (1989) suggest that while some crop types support high prey abundance, the dense cover of vegetation in cultivated fields makes prey inaccessible to Swainson's hawk during much of the spring and summer. Prey are accessible during harvest and Swainson's hawks often are observed foraging in close association with harvesting equipment. Some crops (e.g. alfalfa) provide accessible prey throughout the hawk's residency period because frequent harvest and irrigation expose or concentrate prey, making them vulnerable to predation by hawks.

The temporal availability of foraging opportunities is discussed in the Draft EIR/EIS. In this Addendum, additional information is presented on the temporal availability of foraging opportunities based on time of harvest in the Natomas Basin. For example, alfalfa is harvested and irrigated monthly beginning in April and continuing through September, thus providing foraging opportunities in every month during which hawks are in the Basin. In contrast, corn is harvested only in September. This Addendum assumes that prey are accessible in corn only during September, and the 924 acres of corn in the Basin are considered to provide potential foraging habitat only during that month. The months in which each cover type is considered to provide foraging opportunities for Swainson's hawks are shown in Table 2. For crops harvested during a 2-month period (e.g. sugar beets), half of the acreage is assumed to be harvested in each month.

TABLE 2
Months in which Each Cover Type Provides Foraging Opportunities for Swainson's Hawk

Cover Type	Months	Comment
Non-rice crop		
Sugar beet	September – October ^a	None
Tomato	July – August	None
Corn	September	None
Safflower	August	None
Onions and garlic	August	None
Melons, squash and cucumber	October ^a	Pumpkins
Beans	October ^a	None
Unspecified row and field crops	July – August	Conservatively assumed to be the same as tomatoes
Wheat	June	None
Pasture		
Alfalfa	April – September	None
Clover	April – September	None
Unspecified or mixed	April – September	None
Grassland	April – September	Grassland were assumed to be consistently usable as foraging habitat.

TABLE 2
Months in which Each Cover Type Provides Foraging Opportunities for Swainson's Hawk

Cover Type	Months	Comment
Idle	April – September	Idle fields were assumed to be consistently usable as foraging habitat.
Ruderal	April – September	Ruderal lands were assumed to be consistently usable as foraging habitat.

^a Swainson's hawks have migrated out of the Natomas Basin by October and if these crops were harvested in October they would not provide any foraging habitat for Swainson's hawks.

Sources: J. Williams, University of California, Davis Agricultural Extension Program, pers. comm.
J. Dickey, CH2M HILL, pers. comm.
Smallwood (1995)

2.3 Assumptions for Mitigation Lands Implementation Scenarios

The additional information on habitat value and the temporal availability of foraging habitat allows further refinement on the potential effects of the NBHCP on Swainson's hawk. One component of the NBHCP is the acquisition and management of lands by TNBC to provide habitat for Covered Species. The NBHCP specifies the total acreage of land to be acquired and the habitat composition to be provided in the reserves. To meet the reserve requirements, the NBHCP allows TNBC to acquire lands that currently provide habitat for Covered Species and manage and protect those lands in perpetuity. Alternatively, TNBC can acquire lands that do not provide habitat for Covered Species and implement actions to create habitat. As a result of this flexibility, there is a range of possible future habitat conditions in the Natomas Basin depending on how much of the reserve acreage consists of existing habitat. To clarify further the potential effects of the NBHCP on Swainson's hawks, three implementation scenarios are considered in this Addendum to capture the range of possible habitat conditions that could occur under the NBHCP. The following text describes the acreage and habitat composition requirements specified in the NBHCP, the assumptions on the value and temporal availability of foraging opportunities of habitats on the reserve, and the assumptions for the range of implementation scenarios used to refine the effects on the NBHCP on Swainson's hawk in this document.

2.3.1 Summary of NBHCP Requirements and Assumptions for Mitigation Lands

The NBHCP requires that 8,750 acres be acquired and maintained in a habitat reserve system (i.e., the Mitigation Lands) as mitigation for Authorized Development (i.e., the 17,500 acres of development authorized under the NBHCP). Of this 8,750 acres, 4,375 acres would be in rice, 2,187.5 acres would be managed marsh, and 2,187.5 acres would be upland habitat¹. Foraging opportunities for Swainson's hawk occur in the upland habitat, as well as portions of the rice and managed marsh, as discussed below. The assumptions used in this Addendum for this habitat are presented below:

- The 2,187.5 acres of upland habitat would be primarily managed to provide foraging habitat for Swainson's hawk. This habitat is assumed to be of High value and to provide consistently accessible prey through the hawk's residency period in the Natomas Basin.

¹ The NBHCP stipulates that the acreage of managed marsh can be increased up to 6,562.5 acres under certain conditions.

- The NBHCP requires fallowing of 10 percent of the rice each year and implementation of management practices to increase foraging habitat value for Swainson's hawk (Section V.4.b). The 437.5 acres of fallowed rice under the NBHCP is assumed to provide consistently accessible prey throughout the hawk's residency period, but is classified as Moderate-value habitat because prey likely would not be able to achieve high abundance in the short period during which the rice is fallowed.
- The managed marsh includes an upland component comprising 20 to 30 percent of the acreage. This upland habitat would consist mainly of annual and perennial grassland similar to native foraging habitat for Swainson's hawk. This habitat is assumed to provide consistently accessible prey for Swainson's hawk but to be of Moderate habitat value because of low to moderate prey abundance (Rinek, Personal Communication). Managed marsh is assumed to provide 546.9 acres (25 percent of 2,187.5 acres) of potential foraging habitat for Swainson's hawk.

2.3.2 Implementation Scenarios

The NBHCP does not identify specific lands to be acquired as Mitigation Lands to meet these requirements, and allows acquisition of lands that currently provide habitat to meet the acreage requirements. With this implementation flexibility, a range of possible outcomes exists for future habitat conditions in the Natomas Basin for Swainson's hawk. This Addendum considers three possible scenarios to encompass the possible range of future habitat conditions in the Natomas Basin depending on habitat value and temporal availability of foraging opportunities provided by lands incorporated into the reserve system. The three possible scenarios are summarized in Table 3 at the end of this section.

Under Scenario 1, it is assumed that all of 2,187.5 acres of upland habitat in the reserves consist of TNBC acquiring lands that currently do not provide foraging opportunities for Swainson's hawk and converting those lands to suitable foraging habitat. Similarly, the 546.9 acres of upland habitat associated with managed marsh is assumed to be created from lands that currently do not provide foraging opportunities for Swainson's hawk. The 10 percent of fallowed rice also is assumed to be derived for lands that do not currently provide foraging habitat for Swainson's hawk because it is assumed that in the absence of the NBHCP's fallowing requirement these lands would be flooded to produce rice. Thus, under Scenario 1, all potential foraging habitat for Swainson's hawk is considered to be newly created and, therefore, additive to other foraging habitat remaining in the Basin.

Under Scenario 2, upland habitat associated with managed marsh and fallowed rice come from lands that currently do not provide foraging opportunities for Swainson's hawk as assumed for Scenario 1. The 2,187.5 acres of upland habitat, however, is assumed to be derived from a row crop that can be used by Swainson's hawk for foraging. Row crops can provide Low or Moderate value as foraging habitat. For Scenario 2, the lands acquired for the reserve is used to consist of row crops that provide Low value. It was assumed that TNBC converted the row crops to a High-value cover type for Swainson's hawk foraging. To analyze the future temporal availability of foraging opportunities under Scenario 2, it is assumed that the row crops incorporated into the reserve consist of a crop harvested in September and, therefore, provide foraging opportunities in this month only. It is assumed that TNBC converted the crop to a cover type that provides foraging opportunities continually during April through September.

Scenario 3 constitutes the worst case for Swainson's hawk foraging habitat because it assumes that much of the upland habitat in the reserves consists of lands that currently provide High-value foraging habitat for hawks. For the habitat value analysis, all of the High-value habitat remaining outside of development areas (1,102 acres) is incorporated into the reserves. The remaining 1,085 acres of upland habitat required in the reserves are assumed to consist of lands that currently provide Moderate-value habitat. It is assumed that TNBC converts or manages these lands such that they provide High-value habitat. For the temporal availability analysis, all of the habitats remaining outside of development areas that provide foraging opportunities during April through September (1,102 acres) are assumed to be incorporated into the reserves with the balance of the required acreage assumed to come from a crop that is harvested in June. It was assumed that TNBC converted the crop to a cover type that provides foraging opportunities continually during April through September. Upland habitat associated with managed marsh and fallowed rice is assumed to come from lands that currently do not provide foraging opportunities for Swainson's hawk as assumed for Scenario 1.

Future habitat conditions identified in this Addendum, the 2002 Technical Memorandum, and the EIR/EIS are determined by first assuming that habitat in areas of Authorized Development were lost. Habitat conditions outside of Authorized Development areas are assumed not to change, based on the assumptions described above for each of the implementation scenarios. Future habitat conditions in the Natomas Basin are predicted in consideration of the implementation of the NBHCP. For Scenario 1, the acreage of upland habitat to be provided in the reserves is added to the foraging habitat projected to remain outside of development areas. For Scenario 2, the acreage of foraging habitat provided by fallowed rice and the upland component of managed marsh is added to the habitat projected to remain outside of development areas. To determine habitat value, the 2,187.5 acres of upland habitat in the reserves is accounted for by moving acres from the Low value class to the High value class. To determine temporal availability, the upland habitat in the reserves is assumed to provide additional foraging opportunities during April through August but not to provide any additional foraging opportunities in September. For Scenario 3, the 1,102 acres of High-value habitat is assumed to be incorporated into the reserves. To account for the remaining 1,085 acres, in this habitat value analysis this acreage is moved from the "Moderate" value class to the "High" value class. To determine temporal availability, the upland habitat in the reserves is assumed to provide additional foraging opportunities during April, May, July, August, and September, but not to provide any additional foraging opportunities in June.

TABLE 3

Summary of Assumptions for the Implementation Scenarios used to Evaluate the Range of Potential Effects to Foraging Habitat for Swainson's Hawk from Implementing the NBHCP.

Scenario	Description
Scenario 1	<p>The 2,187.5 acres of upland habitat in the reserve is derived from cover types that currently do not provide foraging opportunities for Swainson's hawk. The upland habitat would be managed as High-value habitat and would provide consistently accessible prey throughout the hawk's residency period of April through September.</p> <p>Fallowed rice provides 437.5 acres of potential foraging habitat and is derived from non-habitat (i.e., formerly flooded rice fields). Fallowed rice is assumed to provide consistently accessible prey throughout the hawk's residency period but to be of Moderate value because of moderate prey abundance.</p> <p>The upland component of managed marsh would provide 546.9 acres of potential foraging habitat and is derived from lands that are not currently classified as foraging habitat. Upland habitat in managed marsh is assumed to provide consistently accessible prey throughout the hawk's residency period, but to be of Moderate value because of moderate prey abundance.</p>
Scenario 2	<p>For assessing future habitat value, the 2,187.5 acres of upland habitat in the reserve is derived from a crop providing Low-value habitat. For the analysis of temporal availability of foraging opportunities, the 2,187.5 acres of upland habitat in the reserve is derived from a crop that provides foraging opportunities in September when it is harvested. The upland habitat in the reserve is assumed to be managed as High-value habitat and would provide consistently accessible prey throughout the hawk's residency period of April through September.</p> <p>Fallowed rice and the upland component of managed marsh provide foraging opportunities as under Scenario 1.</p>
Scenario 3	<p>For the 2,187.5 acres of upland habitat, 1,102 acres of High-value habitat remaining after Authorized Development is incorporated in the reserves. The remaining (1,085 acres) of upland habitat is derived from a crop providing Moderate-value habitat and harvested in June. The created upland habitat is of High value and provides consistently accessible prey throughout the hawk's residency period of April through September.</p> <p>Fallowed rice and the upland component of managed marsh provide foraging opportunities as under Scenario 1.</p>

Additional Information Clarifying Baseline Conditions

Using the assumptions presented in Section 2 of this Addendum, this section presents the refined analysis to clarify the 2002 Biological Resources Technical Memorandum.

3.1 Value of Foraging Habitat

On the basis of the habitat value ratings in Table 1 combined with DWR land cover data, the habitat database developed for the Draft EIR/EIS indicates that most of the potential foraging habitat in the Natomas Basin is of Moderate value (Table 4). Less than 10 percent of the potential foraging habitat in the Natomas Basin is classified as High value. High-value potential foraging habitat generally occurs in scattered patches throughout the Natomas Basin (Figure 1). Given the small amount of High-value habitat in the Basin, hawks might need to forage over large distances to find a sufficient amount of suitable prey.

TABLE 4
Baseline Conditions and Changes in Potential Swainson's Hawk Foraging Habitat by Habitat Value (acres)

Habitat Value Class	Baseline	City of Sacramento	Metro Air Park	Sutter County	Total Change	Remaining Foraging Habitat ^a
High	1,835	(675)	(50)	(8)	(733)	1,102
Moderate	15,666	(5,098)	(349)	(1,852)	(7,299)	8,367
Low	4,550	(1,152)	(4)	0	(1,156)	3,394

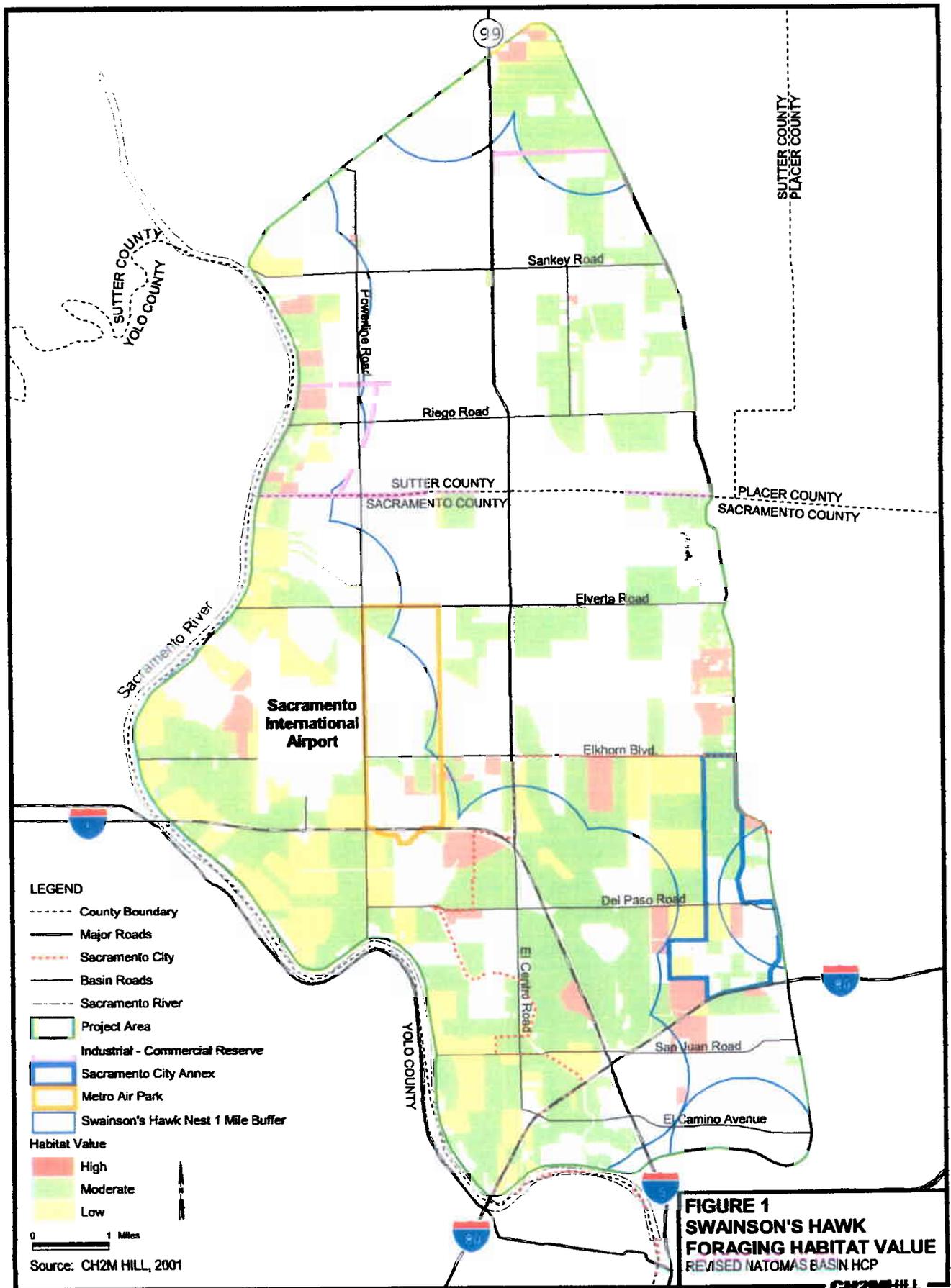
(#) Decrease in acreage

^a Remaining Foraging Habitat represents habitat assumed to remain outside of areas of Authorized Development. It does not include habitat created and maintained under the NBHCP.

Source: Habitat and Land Use Assessment Database prepared for NBHCP Draft EIR/EIS and Biological Resources Technical Memo (CH2M HILL 2002)

3.2 Temporal Availability of Foraging Opportunities

Swainson's hawks forage opportunistically and are reported to travel large distances (up to 18 kilometers [km]) to forage. Foraging patterns appear to reflect the temporal and spatial accessibility of prey. Estep (1989) reports that hawks with a large amount of alfalfa or pastureland in their territories tend to have smaller and more stable foraging ranges throughout the spring and summer than do hawks nesting in areas dominated by row crops. The smaller, more stable home range is attributed to alfalfa and pastureland providing consistently accessible prey such that the hawks did not need to travel long distances to forage.



For one hawk nesting in an area dominated by row and grain crops, Estep (1989) reports a marked increase in foraging range during June and July and attributed this increase to reduced accessibility of prey in row crops because of dense vegetation coverage. This hawk's foraging range constricted in the late summer (August) when crops were being harvested near its nest.

In Washington, Bechard (1982) reports that Swainson's hawk home ranges increase as the acreage of cultivated land consisting of wheat, peas or mustard increases and the acreage of uncultivated land (i.e., pasture and "eyebrows"²) decreases. As does Estep (1989), Bechard (1982) reports that cultivated fields have high prey abundance, but are not to be used by Swainson's hawk until harvest activities make prey accessible. Where habitats such as alfalfa, which provides consistently accessible prey, predominate near nest sites, home ranges of Swainson's hawk are small (Woodbridge, 1991, cited in England et al., 1997; Estep, 1989; Bechard, 1982).

Considering the seasonality of foraging opportunities of each cover type, the acreage of usable foraging habitat available in the Natomas Basin varies considerably during the period when Swainson's hawks are in the Basin (Figure 2). Most of the potential foraging habitat in the Basin consists of row and field crops that predominantly provide foraging opportunities only late in the summer and early fall when the crops are being harvested. The least amount of potential foraging habitat is available during April, May, and July.

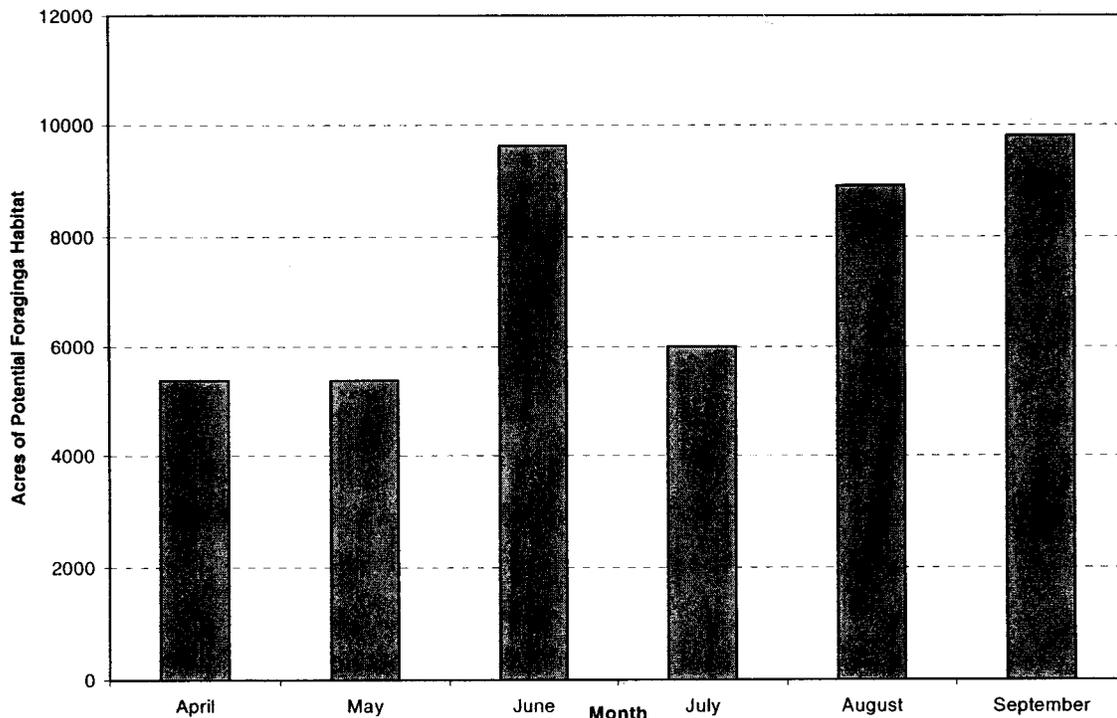


FIGURE 2
Monthly Availability of Potential Foraging Habitat for Swainson's Hawk under Baseline Condition.

² "Eyebrows" is a local term for narrow patches of unplowed land on steep hillsides.

Swainson's hawk lay eggs in April and young fledge in July (Estep 1989). Thus, much of the potential foraging habitat in the Natomas Basin does not provide accessible prey during the nesting period.

3.3 Habitat Conditions Close to Nest Sites

Swainson's hawk can forage over large areas (up to about 18 miles [Estep, 1989]), thus all of the Natomas Basin is accessible to Swainson's hawks nesting along the Sacramento River and elsewhere in the Basin. Reproductive success, however, declines as distance to foraging habitat from the nest increases (Woodbridge, 1991, cited in England et al., 1997). England et al. (1995) reports lower reproductive success for birds nesting in urban areas (Davis and Stockton, California) as compared to birds nesting in rural areas. Based on findings by Babcock (1995) that hawks typically did not return to the nest with prey caught far from a nest and the absence of nesting birds in nearby urban areas that are surrounded by habitats unsuitable for foraging (e.g., Lodi), he attributes this difference to urban nesting birds traveling farther to forage.

The availability and quality of habitat near nests has the potential to influence reproductive success, thus changes in foraging habitat within 1 mile of nest sites under the NBHCP also were evaluated in the 2002 Biological Resources Technical Memorandum and are further refined in this Addendum. The acreage of potential foraging habitat within 1 mile of nest sites identified through 2001 is shown in Table 5. Most of this acreage consists of Moderate-value habitat; only 899 acres of habitat designated as High value occurs within 1 mile (Table 6). Much of the Moderate-value habitat consists of row crops that predominantly provide foraging opportunities late in the summer and early fall during harvest, and therefore does not contribute to foraging habitat during the nesting season. Based on this information, it appears that hawks nesting in the Natomas Basin have little foraging habitat available near nest sites under existing conditions during the nesting season.

TABLE 5
Baseline Conditions and Change in Potential Foraging Habitat within 1 Mile of Swainson's Hawk Nest Sites (acres)

Habitat Class	Baseline	City of Sacramento	Metro Air Park	Sutter County	Total Change	Remaining Foraging Habitat ^a
Alfalfa	280	0	0	0	0	280
Grassland	51	(21)	0	0	(21)	30
Idle	619	(264)	(47)	0	(311)	308
Non-rice Crops	9,698	(2,523)	(232)	(159)	(2,915)	6,784
Pasture	353	(3)	(20)	0	(23)	330
Ruderal	1,444	(868)	(6)	(5)	(879)	565
Total	12,446	(3,679)	(305)	(165)	(4,149)	8,297

(#) Decrease in acreage

^a Remaining Foraging Habitat represents habitat assumed to remain outside of areas of Authorized Development. It does not include habitat created and maintained under the NBHCP.

Source: Habitat and Land Use Assessment Database prepared for NBHCP Draft EIR/EIS and Biological Resources Technical Memo (CH2M HILL, 2002)

TABLE 6

Baseline Conditions and Change in Potential Foraging Habitat by Habitat Value within 1 Mile of Swainson's Hawk Nest Sites (acres)

Habitat Value Class	Baseline	City of Sacramento	Metro Air Park	Sutter County	Total Change	Remaining Foraging Habitat^a
High	899	(264)	(47)	0	(311)	588
Moderate	8,532	(3,079)	(252)	(164)	(3,498)	5,035
Low	3,014	(336)	(4)	0	(339)	2,674
Total	12,445	(3,679)	(305)	(164)	(4,148)	(8,297)

(#) Decrease in acreage

a Remaining Foraging Habitat represents habitat assumed to remain outside of areas of Authorized Development. It does not include habitat created and maintained under the NBHCP.

Source: Habitat and Land Use Assessment Database prepared for NBHCP Draft EIR/EIS and Biological Resources Technical Memo (CH2M HILL, 2002)

Additional Information Clarifying Effects of Implementing the NBHCP

4.1 Changes in Foraging Habitat from Authorized Development

With implementation of the NBHCP, Authorized Development would occur in the City of Sacramento, Sutter County, and Metro Air Park (Draft NBHCP EIR/EIS, 2002). As discussed in the Draft EIR/EIS (see Table 4-12 of the Draft EIR/EIS), this level of development would result in the loss of about 9,188 acres of potential foraging habitat in the Basin. Most (7,299 acres) of the habitat that would be affected would comprise a variety of row and field crops with Moderate habitat value (Table 4). Somewhat more than 10 percent (733 acres) would be High-value habitat. As noted in Section 1, above, the impact to Swainson's hawk from a reduction in foraging habitat was evaluated in the 2002 Biological Resources Technical memorandum. This Addendum provides additional information clarifying the less-than-significant impact determination made in the Draft EIR/EIS (see Section 4.4.5.2.11 of the Draft EIR/EIS).

The primary effect of urban development on foraging habitat for Swainson's hawk would be a reduction of the acreage of usable foraging habitat late in the summer (primarily August and September). Young have fledged by this time, the reduction in row and field crops would not be expected to affect immediate reproductive success. For hawks still on the breeding grounds and preparing to migrate in August and September, it is unlikely that foraging opportunities would be limiting. Of the crop and cover types investigated by Estep (1989), tomatoes and beets had the highest relative abundance of prey species. Prey species were two to three times greater in tomatoes and sugar beets than alfalfa and dryland pasture. These prey become available all at once during harvest in late July through September resulting in an abundance of accessible prey during these months.

Of the 9,188 acres lost, urban development would affect 733 acres of High-value potential foraging habitat. None of the 371 acres of alfalfa would be impacted. Most of the reduction would consist of idle lands that while designated as High habitat value in this analysis, probably encompass a wide range of habitat value for Swainson's hawk. Of this 733 acres, only 311 acres of foraging habitat classified as High value and within 1 mile of a known nest site would be affected by Authorized Development.

Reproductive success of Swainson's hawk appears to fluctuate in response to prey availability (Bechard, 1983; Houston and Schmutz, 1995). Houston and Schmutz (1995) report that the number of young per successful nest appeared stable between for three decades up until 1987 but declined thereafter with the six years of 1988 through 1993 showing the lowest number of young per successful nest. They noted that the decline in reproductive success corresponded with a decline in the hawk's primary prey of ground squirrel. Nesting density also was higher during years of high prey availability as compared to years characterized as normal prey availability. During a 4 year study, Bechard (1983) monitored reproductive success and nestling weight at hawk nests in cultivated areas and uncultivated but grazed

areas. He found lower reproductive success and lower nestling weights at nests in cultivated areas. Interpreting nestling weight as an index of food availability, he suggested that Swainson's hawks adjust brood size in response to prey availability.

Without the implementation of any habitat conservation measures, the loss of 733 acres of High-value habitat could adversely affect the reproductive success of Swainson's hawks in the Natomas Basin and/or the size of the nesting population. High-value foraging habitat for Swainson's hawk provides moderate to high abundance of prey that is consistently accessible. The loss of High-value areas has greater potential to adversely affect the size of the nesting population of Swainson's hawk in the Natomas Basin and its reproductive success than does the loss of Moderate or Low-value habitat because most of the Moderate and Low-value habitat consists of row and field crops that predominantly provide foraging opportunities when the crops are harvested after the nesting season.

4.2 Effects of NBHCP Conservation Measures on Foraging Habitat

4.2.1 General Discussion of Effects

Under the NBHCP, Mitigation Lands would be established outside of the area of Authorized Development. Mitigation Lands would be maintained in perpetuity and specifically managed to provide habitat for the Covered Species. The reserves would not be the only foraging habitat available to Swainson's hawks nesting in the Natomas Basin. Agricultural lands outside the Authorized Development areas in the Natomas Basin also would continue to provide foraging opportunities. In addition, foraging habitat is available in Yolo County on the west side of the Sacramento River. Yolo County supports more than 200,000 acres of non-rice agricultural crops with about 40,000 acres of alfalfa (California Agricultural Commissioners, 2003). While only a portion of this habitat would be within the foraging distance of hawks nesting on the Sacramento River, lands in Yolo County nonetheless contribute to the foraging habitat base for the Swainson's hawk population in the Natomas Basin.

Under the NBHCP, 2,187.5 acres of the Mitigation Lands would be upland habitat managed specifically to provide foraging habitat for Swainson's hawk. Upland habitat in the reserves would be managed to provide consistently available and abundant prey for Swainson's hawk. A specific habitat or crop type that would comprise the upland habitat is not specified in the NBHCP, thereby allowing TNBC to select the most effective and appropriate cover type for a particular property for providing foraging opportunities for Swainson's hawks. Effective cover types could include alfalfa where feasible, native grasses or other mixes of legumes, grasses and herbs. TNBC currently is working with agricultural experts from the University of California Davis Cooperative Extension Program to identify plant mixes that support abundant prey and allow management in a manner that makes prey regularly available to Swainson's hawk throughout their residency period (e.g., regular irrigations, harvest and/or mowing).

In addition to the 2,187.5 acres of upland habitat, foraging opportunities for Swainson's hawk also would be available in portions of the reserve system managed for the giant garter snake. The Mitigation Lands will include 4,375 acres of rice. Ten percent of the rice will be fallowed each year, providing 437.5 acres of foraging habitat for Swainson's hawk. Managed marsh created for giant garter snake would contain 20 to 30 percent upland habitat. These upland

areas predominantly would consist of grassland habitat comparable to native grassland habitat formerly present in the Natomas Basin. Managed marsh and rice fields of the reserves would provide 978.4 total acres of potential foraging habitat for Swainson's hawk.

4.2.2 Effects Considering the Value of Foraging Habitat

As discussed in the 2002 Biological Resources Technical Memorandum, future habitat conditions with implementation of the NBHCP cannot be predicted precisely because the foraging habitat value on Mitigation Lands yet to be acquired remains to be determined. The range of future conditions under the NBHCP is identified through consideration of the three implementation scenarios described above (Table 3).

Scenario 1 represents the best possible future condition for Swainson's hawk because all foraging habitat in the reserves would be derived from lands that currently do not provide foraging opportunities for Swainson's hawk, representing the largest increase in foraging habitat. Under this scenario, the Natomas Basin would support about 16,035 acres of potential foraging habitat, about 6,016 acres less than under the baseline condition (Table 7 and Figure 3). With the NBHCP, however, the amount of High-value habitat would nearly double relative to baseline conditions, with the reduction in habitat primarily affecting Moderate and Low-value habitats.

Scenarios 2 and 3 would result in about 13,847 acres of potential foraging, which is a reduction of about 8,204 acres relative to baseline conditions (Table 7). As in Scenario 1, the amount of High-value habitat would nearly double under Scenario 2. The acreage of Moderate and Low-value habitat would decrease under Scenario 2 with the acreage of Low-value habitat decreasing to a greater extent than under Scenario 1.

Scenario 3 would result in the least amount of High-value habitat and would result in only a small increase (about 350 acres) in High-value habitat over baseline conditions. Moderate- and Low-value habitat would decrease under Scenario 3 as under Scenario 1. The smaller increase in High-value habitat under Scenario 3 develops from the assumption of this scenario that all remaining High-value habitat is incorporated into the reserves.

TABLE 7
Change in Potential Foraging Habitat by Habitat Value With Implementation of the NBHCP (acres)

Habitat Value Class	Baseline	Acres Affected by Development	Remaining Foraging Habitat ^a	Scenario 1 ^b	Scenario 2 ^b	Scenario 3 ^b
High	1,835	733	1,102	3,290	3,290	2,188
Moderate	15,666	7,299	8,367	9,351	9,351	8,265
Low	4,550	1,156	3,394	3,394	1,207	3,394
Total	22,051	9,188	12,863	16,035	13,847	13,8475

(#) Decrease in acreage

^a Remaining Foraging Habitat represents habitat assumed to remain outside of areas of Authorized Development. It does not include habitat created and maintained under the NBHCP.

^b See Table 3 for description of each scenario

Source: Habitat and Land Use Assessment Database (CH2M HILL, 2002)

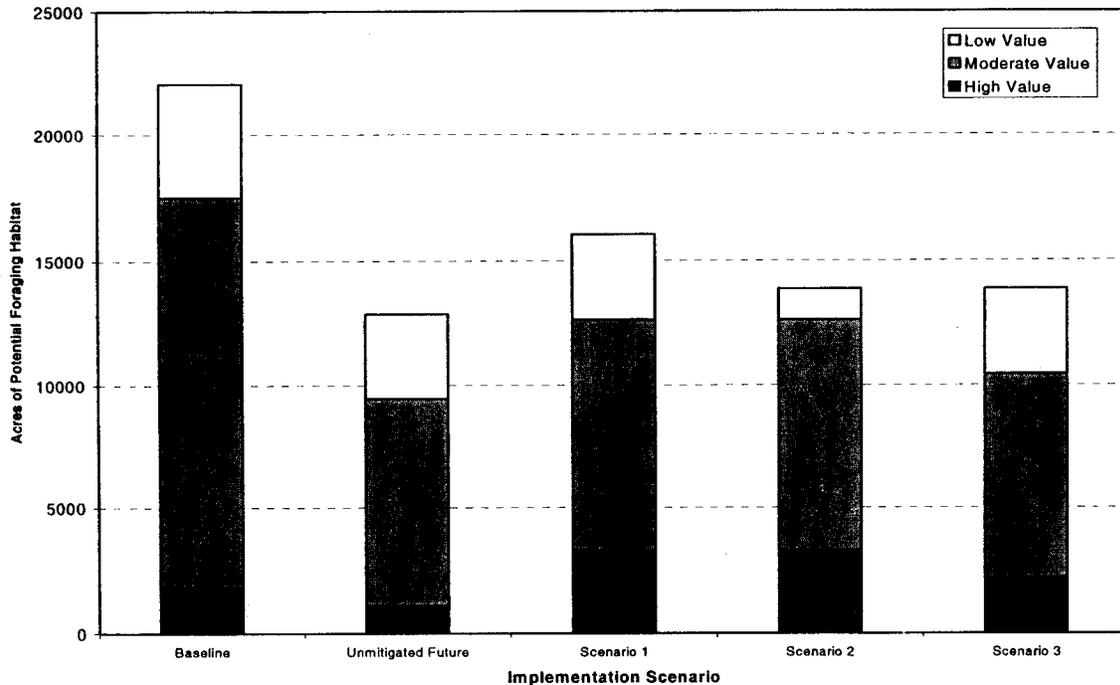


FIGURE 3
Acres of Potential Foraging Habitat for Swainson's Hawk by Habitat Value under Existing Conditions and with Implementation of the NBHCP.

4.2.3 Effects Considering the Temporal Availability of Foraging Opportunities

The upland habitat on the reserves will be managed to provide consistently accessible and abundant prey for Swainson's hawk throughout their residency. Table 8 and Figure 4 show the monthly distribution of foraging habitat availability under the three scenarios considered and assuming continuation of baseline cropping patterns in areas outside of Authorized Development and the NBHCP reserves.

TABLE 8
Change in acres providing foraging opportunities each month with implementation of the NBHCP

Month	Baseline	Acres Affected by Development	Remaining Foraging Habitat ^a	Scenario 1 ^b	Scenario 2 ^b	Scenario 3 ^b
April	5,365	2,671	2,694	5,866	5,866	4,765
May	5,365	2,671	2,694	5,866	5,866	4,765
June	9,625	4,667	4,958	8,130	8,130	5,942
July	6,002	2,851	3,151	6,323	6,323	5,222
August	8,923	3,451	5,471	8,643	8,643	7,542
September	9,806	4,539	5,268	8,470 ^b	6,282	7,369

(#) Decrease in acreage

^a Remaining Foraging Habitat represents habitat assumed to remain outside of areas of Authorized Development. It does not include habitat created and maintained under the NBHCP.

^b See Table 3 for description of each scenario

Source: Habitat and Land Use Assessment Database (CH2M HILL, 2002)

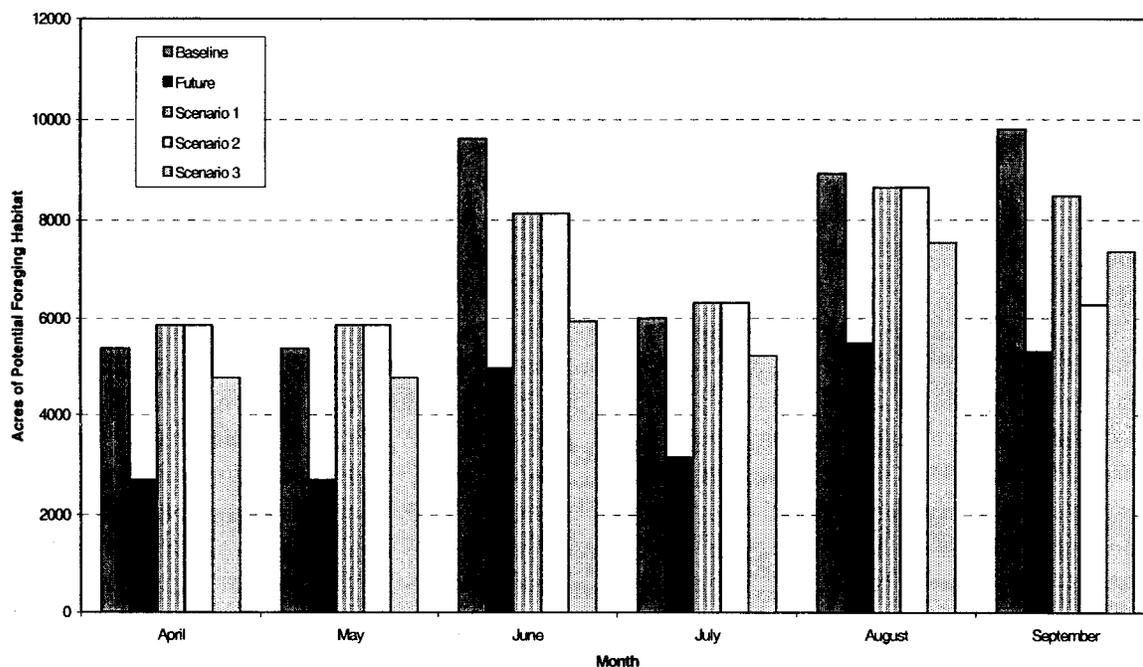


FIGURE 4
Monthly Availability of Potential Foraging Habitat for Swainson's Hawk under Baseline Conditions and With Implementation of the NBHCP

Scenarios 1 and 2 would increase the availability of foraging habitat relative to baseline conditions during April, May and July, the nesting period for Swainson's hawk. Prey availability during these months can influence nesting density (Houston and Schmutz, 1995) and reproductive success. In June, foraging habitat availability under Scenarios 1 and 2 would be slightly less than baseline conditions. Although the acreage of foraging habitat in June could be less than baseline conditions, it would be greater than that available during the other months of the breeding season (April, May, and July). Because the amount of habitat available during April, May, and July under the baseline condition is sufficient to support the current nesting population, providing at least that level of habitat during June is anticipated to be sufficient to continue to support this population level. With similar or improved habitat availability during the nesting season under Scenarios 1 and 2, no significant adverse effects to the nesting population or reproductive success would be expected from changes in foraging habitat.

The amount of foraging habitat available during August and September under Scenarios 1 and 2 would be less than that under baseline conditions. Accessible prey is anticipated to be abundant in these months because of the high abundance of prey that becomes available during the short harvest season and, therefore, foraging habitat is not anticipated to be limiting.

Further, because the young have fledged by this time, hawks are not restricted to areas near nests and can seek more productive foraging opportunities if necessary in more distant areas. Therefore, no adverse effects to Swainson's hawk are expected from reduced foraging opportunities during August and September.

Under Scenario 3, foraging opportunities would be reduced in all months relative to baseline conditions. For the following reasons, however, Scenario 3 is not likely to occur, and is included to provide a worst-case, yet unlikely scenario. The assumption of Scenario 3 is that all existing High-value habitat is incorporated into the reserve system. Areas of High-value habitat occur in many small, isolated parcels throughout the Natomas Basin. In acquiring reserve lands, TNBC must establish reserves at least 400 acres in size of which at least one must be at least 2,500 acres. TNBC is currently seeking to build upon its existing reserves to create several large reserve centers. With this approach and the acreage restrictions, it is not considered likely that TNBC will incorporate all of the isolated parcels of High-value habitat and therefore would need to create a greater amount of upland habitat than assumed under Scenario 3. The difference in acreage between baseline and Scenario 3 during April and May is only 600 acres. If only half of the lands providing foraging opportunities during the nesting season (April through July) are incorporated into the reserve system with the remainder of the required upland acreage created, foraging opportunities under the NBHCP would be about the same as baseline in April, May and July. The acreage of foraging opportunities in June would be less under Scenario 3 than under baseline, but would exceed the baseline acreage in April, May, and July. As explained for Scenarios 1 and 2, because habitat availability in June under Scenario 3 would be greater than what currently is available during the other months of the nesting season (April, May, July), foraging opportunities in June under Scenario 3 are expected to remain sufficient to support population levels.

Proximity to Nest Trees

An additional benefit of the NBHCP for Swainson's hawk that is not easily quantified is that foraging habitat provided in the Mitigation Lands often will be located in close proximity to nesting habitat. This will be accomplished through establishing upland reserves near known nest sites (e.g., within the Swainson's Hawk Zone) and by planting trees on the reserves that will provide new nesting opportunities near foraging habitat. Under the NBHCP, TNBC seeks to acquire land for upland reserves close to known nest sites because of the energetic benefit and associated reproductive success improvement from the availability of nearby foraging habitat. To date, TNBC has been successful in acquiring lands near known nest sites (e.g., Sousa, Cummings, and Alleghany 50). Several of the lands acquired to fulfill requirements for rice and managed marsh also are close to known nest sites (e.g., Bennett South, Frazer North). The Sousa, Cummings and Alleghany 50 tracts encompass about 160 acres and currently support non-rice crops that provide Low- or Moderate-value foraging habitat for Swainson's hawk. These lands will be converted to High-value foraging habitat under the NBHCP.

Currently, only 899 acres of High-value foraging habitat occurs near (within 1 mile) of known nest sites. Of this amount, 311 acres would be lost because of Authorized Development (Table 6). With the NBHCP, much if not all of the 2,187.5 acres of High-value upland habitat is expected to be within 1 mile of a nest site, substantially increasing the amount of High-value habitat near nest sites where it is most valuable.

4.3 Changes in Nesting Habitat

The Draft EIR/EIS identifies territories in or immediately adjacent to Authorized Development areas that could be eliminated by removal of the nest tree or affected by loss of foraging habitat in the vicinity of the nest tree. Based on data from surveys conducted in 2001, the Draft EIR/EIS identifies seven territories as potentially affected: five within the City, one immediately adjacent to Metro Air Park, and one in Metro Air Park. In 2002, the two nest sites on and adjacent to Metro Air Park were removed. Of the five territories located in the City, two (NB-2 and NB-6) are in the right of way of Interstate 5 and would not be removed although, as described in the Draft EIR/EIS (Section 4.4.5.2.11), they could be abandoned as a result of loss of nearby foraging habitat and urban encroachment. The remaining three territories could be lost if the nest trees are removed.

The potential loss of five territories is not expected to adversely affect the nesting population of Swainson's hawk for several reasons. Surveys for Swainson's Hawk territories in the Natomas Basin conducted annually since 1999 have identified 70 territories in the Natomas Basin and along the Sacramento River. Not all territories are active each year. For example, in 2002, of the 70 territories, 43 were active (i.e., had at least one adult present on the nesting territory), leaving 27 unoccupied territories (Estep, 2002). Similarly, in 2001, only 46 territories were occupied (Estep, 2002). At most, 5 nest trees would be removed or potentially abandoned because of adjacent urban development. Given that only a portion of the known territories are occupied each year, sufficient alternate nest sites are available to accommodate birds displaced from these territories.

Second, the NBHCP includes a tree planting program to provide additional nesting opportunities when the trees mature. In 2001, 200 trees were planted on the Betts-Kismat-Silva reserve. In 2002, an additional 60 trees were planted at the Bennett South reserve, and in 2003, 83 trees were planted at Betts-Kismat-Silva reserve in 2003. Species planted that could be used for nesting by Swainson's hawk are valley oak and western sycamore. In the Central Valley, nest trees averaged 57.7 feet tall with a standard deviation of 9.8 feet (Estep, 1989). Valley oaks can grow about 3 feet per year (Redwood Barn Nursery, Davis California) and could reach 48 feet (the lower end of the range of tree heights found to be used) in about 16 years. Sycamores grow at a faster rate of 6 to 10 feet per year (Empire National Nursery, 2003) and could achieve this height in 5 to 8 years. Tree planted in 2001 could reach a suitable size to support nesting as early as 2006. Over the longer term, trees planted as part of the conservation strategy of the NBHCP would provide additional nesting opportunities. Based on this information, the potential short-term loss of nest trees because of urban development covered by the NBHCP is not expected to significantly impact Swainson's hawk.

SECTION 5

Conclusions

Additional information on the value of foraging habitat for Swainson's hawk in the Natomas Basin shows that Basin currently supports little High-value habitat. Most of the available habitat is row and field crops that provide Moderate- or Low-value habitat. Further, the row and field crops predominantly provide foraging opportunities in August and September when harvest makes prey accessible. Most of the habitat that would be affected by Authorized Development consists of row and field crops.

Foraging opportunities provided by upland habitat in the reserves created under the NBHCP would be High- or Moderate-value habitat that would provide consistently accessible prey for Swainson's hawk. Assuming that most of the lands incorporated into the reserves are row crops, upland habitat in the reserves would offset reductions in habitat availability from urban development during most of the nesting season (April, May, and July). Foraging habitat availability in June is expected remain sufficient to avoid adverse effects to reproductive success. The NBHCP foraging habitat availability during the nesting season would remain similar to baseline conditions, thus adverse effects on reproductive success or the adult nesting population are not expected. Although foraging opportunities would decline during August and September, foraging opportunities likely are not a limiting factor during these months because of the high abundance of prey that becomes available during the short harvest season. Therefore, effects to Swainson's hawk from changes in foraging habitat under the NBHCP are considered less than significant.

SECTION 6

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Appendix L

Interim Survey Guidelines for
Permittees for Recovery Permits under
Section 10(a)(1)(A) of the Endangered
Species Act for Listed Vernal Pool
Branchiopods, USFWS, April 19, 1996.



IN REPLY REFER TO:

United States Department of the Interior

FISH AND WILDLIFE SERVICE

April 19, 1996

Interim Survey Guidelines to Permittees
for Recovery Permits under Section 10(a)(1)(A)
of the Endangered Species Act for the
Listed Vernal Pool Branchiopods
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Interim Survey Guidelines to Permittees for Recovery Permits under Section 10(a)(1)(A) of the Endangered Species Act for the Listed Vernal Pool Branchiopods

The endangered Conservancy fairy shrimp (*Branchinecta conservatio*), longhorn fairy shrimp (*Branchinecta longiantenna*), vernal pool tadpole shrimp (*Lepidurus packardi*), and the threatened vernal pool fairy shrimp (*Branchinecta lynchi*) were listed on September 19, 1994, under the Endangered Species Act of 1973, as amended (Act) (59 Federal Register 48136). These species are endemic to vernal pools in the Central Valley, coast ranges, and a limited number of sites in the Transverse Range and Riverside County, California. The endangered Riverside fairy shrimp (*Streptocephalus woottoni*) was listed under the Act on August 3, 1993 (58 Federal Register 41391). This species inhabits Riverside, Orange and San Diego Counties, California, and northern Baja California, Mexico. These five species, hereafter referred to as vernal pool branchiopods, are fully protected under the Act. The San Diego fairy shrimp (*Branchinecta sandiegonensis*) is a proposed endangered species. Surveys for all these species should follow the methodologies described in these Interim Survey Guidelines (Guidelines). It is expected that the Guidelines will be revised in the future as additional information becomes available.

These Guidelines are issued as guidance to section 10(a)(1)(A) permittees. Because taking (killing, injuring, harming or harassing) endangered species is strictly prohibited under the Act, a section 10(a)(1)(A) recovery permit must be obtained prior to initiating any surveys or studies that might result in the take of endangered or threatened branchiopods. Failure to obtain this permit may result in violation(s) of section 9 of the Endangered Species Act. Additionally, violation(s) of a section 10(a)(1)(A) permit may result in its non-renewal, suspension or revocation.

For the purposes of these Guidelines, vernal pools and swales are defined as follows:

Vernal pools and swales are ephemeral wetlands that form in areas of California with Mediterranean climates that have shallow depressions underlain by a substrate of

hardpan, clay, or basalt near the surface that restricts the percolation of water. They may be characterized by a barrier to overland flow that causes water to collect and pond. Vernal pools/swales may occur singly, but more typically occur in vernal pool/swale complexes, due to the local hydrology, geology, and topography. Initially, the dry soil in vernal pools/swales becomes wet and starts to saturate during the fall and early winter rains. The second stage in a typical vernal pool cycle is characterized by peak rainfall and inundation of the vernal pools/swales. Vernal pools may remain inundated until spring or early summer, sometimes filling and emptying numerous times during the wet season. The vernal pools gradually dry down during the spring, quite often forming the unique "bathtub ring" of flowers from endemic vernal pool plants blooming profusely at the pool margins. This drying down stage is typified by the production of seeds in the endemic plants and the dispersal of animals from the vernal pools. These pools eventually dry down totally, with the onset of drought conditions. During this final stage, early season and shallow-rooted plants turn brown, and the soil dries and may crack. With average rainfall patterns, vernal pools are typically characterized by a predominantly annual plant community dominated by wetland species.

Note: At this time, vernal pool-associated activities not directed toward the listed species, such as botanical surveys and wetland delineations, are not considered to require a permit. However, persons conducting such activities should minimize any potential impact on the vernal pool branchiopods or plants by reducing the amount of walking through vernal pools to the lowest extent practical. Persons conducting projects that require permits (e.g., branchiopod or amphibian surveys) should also minimize walking through the pools.

I. Survey Approval

Unless otherwise authorized by the U.S. Fish and Wildlife Service (Service) in writing, these Guidelines shall be utilized for all surveys conducted for the listed vernal pool branchiopods. Any deviations from the methods prescribed by these Guidelines must be approved by the Service before surveys are conducted. The permittee shall provide the appropriate Service Field Office (see XI, Service Contact section) with all of the following information in writing for each project site at least 10 working days prior to the anticipated start date of survey work:

- a. The precise location of the project site clearly delineated on either an original or high quality copy of a U.S. Geological Survey topographic map (exact scale, 7.5 minute, 1"=2000 ft.). The map should contain the project name, type of project by category [the categories are: development, mitigation banking, or other (specify)], the estimated area (acreage) of the project site and an estimated number or area (acreage) of pool/swales on the site, quad name, and county name;
- b. Names of all vernal pool biologists and associated personnel with reference to their section 10(a)(1)(A) permit number; and
- c. A written request to commence wet season or dry season sampling for each project to

be surveyed for the listed vernal pool branchiopods.

II. Sampling Survey Completion

a. Once initiated, surveys conducted pursuant to these Guidelines may be suspended prior to completion if:

1. the presence of one or more of the five listed branchiopods on the subject site is determined through identification at any point within the wet season survey cycle; or
2. it is agreed that one or more of the listed vernal pool branchiopods are present on the subject site.

b. Permission to dry season survey for the listed vernal pool branchiopods requires the completion of both the full wet season survey and the dry season survey, including the complete analysis of all dry soil samples (see V).

c. A complete survey consists of sampling for either:

1. two full wet season surveys done within a 5-year period; or
2. two consecutive seasons of one full wet season survey and one dry season survey (or one dry season survey and one full wet season survey).

d. Each vernal pool/swale in a vernal pool/swale complex shall be surveyed as per these Guidelines. However, in the case of a large vernal pool/swale complex, the Service may authorize a representative portion or portions of the vernal pool/swale complex to be surveyed as per these Guidelines.

III. Notification of Presence

Should the permittee determine that any of the five listed vernal pool branchiopods are present at a site, the appropriate Service Field Office (see XI, Service Contact section) shall be notified within 10 working days by letter or telephone.

IV. Wet Season Surveys

Wet season survey sampling shall not be conducted at any project site unless the permittee receives prior permission from the Service (see I (c)).

a. Survey Initiation, Frequency, and Termination

1. Surveyors should visit sites after initial storm events to determine when pools/swales have been inundated. A pool/swale is considered to be inundated when it holds greater than 3 cm of standing water 24 hours after a rain event.
2. Pools/swales shall be adequately sampled once every two weeks, beginning no later than two weeks after their initial inundation and continuing until they are no longer inundated, or until they have experienced 120 days of continuous inundation.
3. In cases where the pools/swales dry and then refill in the same wet season, sampling shall be reinitiated within eight days of refilling every time they meet the 3 cm of standing water criteria and shall continue until they have experienced 120 days of continuous inundation, or until they are no longer inundated.
4. If a vernal pool/swale has already experienced 120 days of continuous inundation, but then dries down and subsequently refills in the same wet season, surveys must be re-initiated in accordance with IV(a)(3) above, each time the vernal pool/swale refills and meets the 3 cm of standing water criteria.
5. Once initiated, surveys conducted pursuant to these Guidelines may be suspended prior to completion if the presence of one or more of the five listed branchiopods on the subject site is determined through identification at any point within the wet season survey cycle

b. Survey Sampling

At each wet season visit, representative portions of the pool/swale bottom, edges, and vertical water column shall be adequately sampled using a seine, dip net or aquarium net appropriate for the size of the pool or swale. Net mesh size shall not be larger than (1/8) inch. Seines shall be examined and emptied of material at least once every five linear meters.

c. Voucher Specimens

1. Voucher specimens shall be collected only once for each individual vernal pool/swale and shall be accessioned to either the California Academy of Sciences (CAS) or the Natural History Museum of Los Angeles County (LACM) (see VIII).
2. Voucher specimens of all listed vernal pool branchiopods captured shall be collected and all other specimens shall be returned in good condition to the vernal pool/swale where they were found as quickly as possible.
3. No more than 20 specimens of each species of listed vernal pool branchiopods from each pool/swale, or less than 10% of the subpopulation present in the pool/swale,

whichever is the lesser amount, shall be retained and preserved as voucher specimens.

4. Only sexually mature, adult branchiopods shall be used for purposes of voucher specimens for species identification. The Service will not accept species identifications made using immature specimens.
5. The sample of 20 voucher specimens shall include no less than three specimens of either sex.

V. Dry Season Surveys

Dry season soil sampling shall not be conducted at any project site unless the permittee receives prior written permission from the Service (see I (c)).

a. Soil Collection

Soil shall be collected when it is dry to avoid damaging or destroying cysts which are more fragile when wet. A hand trowel or similar instrument shall be used to collect approximately one liter volume sample per pool/swale of the top 1-3 cm of pool sediment. Whenever possible, soil samples shall be collected in chunks. The trowel shall be used to pry up intact chunks of sediment, rather than loosening the soil by raking and shoveling which can damage cysts.

In southern California there are a number of federally listed plant species (*Orcuttia californica*, *Pogogyne abramsii*, and *Pogogyne nudiscula*) that often co-occur with the fairy shrimp. Removal of soil could damage populations of these plants by inadvertently removing seed. Dry sampling should be minimized or avoided within those vernal pools/swales that are known to, or may, contain these species. The permittee shall contact the Carlsbad Field Office (see XI, Service Contact section) regarding the distribution of these listed plants species prior to conducting dry sampling in Los Angeles, Orange, Riverside and other southern California counties.

b. Soil Sample Volume

Each soil sample from the 10 soil sample locations shall be labeled, stored, and analyzed individually.

1. A total of 10 soil samples of approximately 100 ml each shall be taken from each pool/swale, for a total soil sample volume of approximately one liter per pool/swale.
2. In the case of a very large playa, dry lake, or vernal pool, the Service may authorize the removal of more than one liter of soil.

3. If a pool has a diameter of less than three meters, the total soil sample taken shall not exceed ½ liter in volume per pool, and the 10 soil samples shall be approximately 50 ml each in volume.

c. Soil Sample Locations

A total of 10 soil samples shall be collected from the following locations within each pool/swale sampled:

1. Starting with one soil sample taken from the edge of the pool/swale, at least four soil samples shall be taken from equidistant points along the longest transect of the pool/swale.
2. Starting with one soil sample taken from the edge of the pool/swale, at least four soil samples shall be taken from equidistant points along the widest transect of the pool/swale.
3. If neither the longest or the widest transect encompasses the deepest part (or parts) of the pool/swale, then at least two soil samples shall be taken from the deepest part (or parts) of the pool/swale..

d. Soil Storage

1. The soil samples from each soil sample location shall be stored in separate bags, labeled with the specific location within the pool/swale from where each soil sample was taken. A sketch of the pool/swale showing the specific location of each soil sample shall be included in the 90-day report.
2. Soil samples containing any residual moisture initially shall be adequately ventilated and allowed to air dry thoroughly before storage of the sample. The bags containing the soil samples shall be kept out of direct sunlight in order to avoid excessively heating the sample.
3. All soil samples shall be retained and stored as directed in V(d)(1) and V(d)(2) above until the Service is able to provide direction in species-level identification of the cysts of all the aforementioned branchiopod species.

e. Soil Sieving

1. The soil samples shall not be ground, crushed, or otherwise manipulated in order to expedite the sieving process. A relatively short period of pre-soaking the soil sample may be helpful/necessary in order to facilitate the sieving process. Small aliquots (approximately 50 ml in volume) of soil shall be gently washed with water through a graded series of U.S. standard eight inch soil sieves ending in mesh sizes 300 micron (um), and 150 micron (um).

2. Sieves must be thoroughly rinsed and visually inspected for any cysts adhered to the sieves prior to the start of sieving. This process must be repeated for each individual soil sample location. Sieves shall also be rinsed and thoroughly inspected upon completion of sieving soil samples.

f. Soil Examination

1. Washed and sieved soil fractions from the 300 um and 150 um sieves shall be examined under a dissecting microscope for tadpole shrimp and fairy shrimp cysts. The process shall be repeated until all individual soil samples have been examined. All sieved material shall be processed and dried as quickly as possible, preferably within one hour from the initial wetting.

Note: Do not return soil to survey sampling site.

2. All fairy shrimp and tadpole shrimp cysts shall be removed from the soil, separated by cyst type into labeled vials, allowed to air-dry, and then stored dry.

g. Cyst Density

Cyst density information for each soil sample location shall be calculated by dividing the total number of cysts recovered by the total amount of soil from the individual aliquots from that soil sample location. Total cyst density information for each soil sample location shall be reported for each species in terms of: none; 1-25 cysts/100 ml soil; 26-50 cysts/100 ml soil; 51-100 cysts/100 ml soil; 101-199 cysts/100 ml soil; or more than 200 cysts/100 ml soil.

h. Cyst Identification

Each fairy shrimp and tadpole shrimp cyst type shall be identified to genus by a qualified biologist. The Service may require an independent review by a crustacean biologist(s) of any vernal pool branchiopod or cyst identification.

There are two options when a branchiopod cyst identification is made to genus:

1. the survey, pursuant to these Guidelines, may be suspended if it is agreed one or more of the listed species are present on the project site; or
2. one subsequent complete wet season sampling survey shall be conducted to complete survey requirements.

VI. Cyst Voucher Specimens

A representative sample of each cyst type from each pool/swale shall be accessioned to either CAS or LACM (see VIII).

VII. 90-Day Reports

a. U.S. Fish & Wildlife Service

The permittee shall provide the appropriate Service Fish and Wildlife Office (listed in the Service Contact section) with all of the following information in writing, using the appropriate Vernal Pool Data Sheet where applicable as the reporting form, no more than 90 calendar days after completing the last field visit of the season at each project site:

1. The location of the project site clearly delineated on an original or high quality copy of a U.S. Geological Survey topographic map (exact scale, 7.5 minute, 1"=2000 ft.). The location of the listed vernal pool branchiopods is to be included on the 7.5 minute maps in as precise a manner as possible (e.g., lat/long or location within a section).
2. Five color photographic 35mm slides and/or 3" x 5" photographs of each project site taken during sampling in the wet season; this is to include two slides and/or photographs taken from standing position that portray the general landscape of the site [i.e., two photos from an opposing axis of the site (e.g., north and south compass headings)]; and three slides and/or photographs of representative vernal pools, swales, and other areas within the site sampled for the five listed vernal pool branchiopod species. The following information shall be legibly written on each slide/photograph with permanent ink: precise location of the project site, direction from which photograph was taken, date of photograph, initials of photographer, and initials of the scientific names of any of the five listed vernal pool branchiopod species that were found at the depicted site.
Note: Slides and/or photographs only need to be submitted once per project site.
3. The estimated number of individuals of any of the listed vernal pool branchiopods observed in each pool/swale shall be reported in terms of an order of magnitude (e.g., 10's, 100's, 1000's).
(Refer to the Vernal Pool Data Sheet)
4. The number of individuals of any of the listed vernal pool branchiopods or cysts preserved from each pool/swale and the name of the institution in which they are accessioned.
(Refer to the Vernal Pool Data Sheet)
5. A qualitative description of the vernal pool/swale community. A general list of amphibian species and non-listed vernal pool crustacean species (by common and/or scientific name) encountered at the project site is desirable. For purposes of this permit a full survey for these species is not required. However, if more detailed information is collected, it shall be included in the Vernal Pool Data Sheet.
(Refer to the Vernal Pool Data Sheet)

6. Data collected during each field visit, including: date, air temperature, water temperature, weather conditions (e.g., sunny, overcast), maximum depth of each pool/swale, and size (area in square meters) of each pool/swale.
(Refer to the Vernal Pool Data Sheet).
7. (Optional) water chemistry data collected during each field visit, including: alkalinity (total: ppm or mg/l), conductivity (uMHO), dissolved oxygen (ppm or mg/l), dissolved NH₄ (ppm or mg/l), pH, salinity (ppt), total dissolved solids (TDS, ppm), and turbidity.
(Refer to the Vernal Pool Data Sheet)

b. California Department of Fish & Game

1. Permittees should consult with the California Department of Fish and Game (916/653-4875) to determine their responsibilities under the California Endangered Species Act and the California Fish and Game Code.
2. The permittee shall supply the California Department of Fish and Game (Natural Diversity Data Base, California Department of Fish and Game, 1807 13th Street, Suite 202, Sacramento, California 95814; telephone 916/322-2494) with completed California Native Species Field Survey Forms, no more than 90 calendar days after completing the last field visit of the season at each project site.

VIII. Accessioning Voucher Specimens

- a. All vernal pool branchiopod voucher specimens (including individuals collected and cysts) shall be accessioned into either the California Academy of Sciences (CAS) or the Natural History Museum of Los Angeles County (LACM). All specimens shall be preserved according to the accession standards of the repository which will accession and maintain the specimens. The October 1995 CAS and September 1995 LACM standards are attached to these Interim Survey Guidelines.
- b. All vernal pool branchiopod voucher specimens (including individuals collected and cysts), along with a copy of the Vernal Pool Data Sheet containing all of the items listed in VII (a), shall be permanently deposited in the CAS or LACM within 90 calendar days of the completion of the field survey and the Service shall be supplied with the CAS or LACM catalog numbers given to the specimens.
- c. The permittee shall supply the CAS or LACM with a photocopy of their section 10(a)(1)(A) permit to validate that the specimens supplied to them were taken pursuant to a permit. The Service will likely consider refusal by the CAS or LACM to accession any listed branchiopod specimens to be a violation by the permittee of their section 10(a)(1)(A) permit (e.g., if due to improper preservation/storage).

California Academy of Sciences (CAS)
Department of Invertebrate Zoology and Geology, Golden Gate Park,
San Francisco, California 94118; telephone (415) 750-7082

Natural History Museum of Los Angeles County (LACM)
Crustacea Section, Invertebrate Zoology, 900 Exposition Boulevard,
Los Angeles, California 90007; telephone (213) 744-3450

IX. Additional information, limitations, and caveats with respect to these Guidelines are as follows:

- a. From time to time, specific circumstances may justify or necessitate revision of these Guidelines, on a case-by-case basis. At the discretion of the Service, such a variance may be allowable under these Guidelines if:
 1. the permittee explains to the Service in writing why the variance to the Guidelines is needed and justified; and
 2. the Service concurs, in writing, with the variance requested by the permittee.
- b. The Service reserves the right to reject vernal pool branchiopod surveys conducted under these protocols as inadequate if:
 1. survey methods used are inconsistent with these Guidelines, unless prior written permission (see I, Survey Approval) has been obtained; or
 2. other information indicates that the survey is inadequate as determined by the Service.

X. Permit Infractions

The Service may consider any of these actions to be a violation by the permittee of their section 10(a)(1)(A) permit:

- a. falsification of any reporting or information;
- b. failure to follow the stated Guidelines sampling methodologies;
- c. failure to obtain prior permission to commence wet season surveys or failure to obtain written permission to commence dry season surveys (see section I (c));
- d. failure to notify the Service within 10 days of a determination of presence of one or more of the listed vernal pool branchiopods on a survey site;
- e. failure to accession voucher specimens or improperly accessioned voucher

specimens;

f. failure to file completed 90-day reports with the Service within 90 calendar days after completing the last field visit of the season at each project site; or

g. failure to file completed Natural Diversity Data Base forms with the California Department of Fish and Game within 90 calendar days after completing the last field visit of the season at each project site.

Violation(s) of a section 10(a)(1)(A) permit may result in its non-renewal, suspension or revocation.

XI. Service Contact

For the Central Valley hydrographic basin and the coast ranges north of the Santa Cruz County line, the Sacramento Fish and Wildlife Office (2800 Cottage Way, W-2605, Sacramento, California 95825; telephone 916/414-6600) should be contacted regarding vernal pool branchiopod issues.

For areas from Santa Cruz County south to Ventura County, contact the Ventura Field Office (2493 Portola Road - Suite B, Ventura, California 93003; telephone 805/644-1766).

For areas from Los Angeles County south to the U.S.- Mexico border, contact the Carlsbad Field Office (2730 Loker Avenue West, Carlsbad, California 92008; telephone 619/431-9440).

**U.S. Fish and Wildlife Service Vernal Pool Data Sheet
Wet Season Survey**

Note: Please fill out the required information completely for each site visit.

Species Observations: state none or estimate # of individuals present in terms of an order of magnitude (e.g., 10's, 100's, 1000's)

Anostracans:
(note reproductive status)

Notostracans:
(note reproductive status)

Species Observations (Optional) :

Cladocerans:	yes	no	Insects: (adult or larvae)		
Conchostracans:	yes	no	Anisoptera:	yes	no
Copepods:	yes	no	Zygoptera:	yes	no
Ostracods	yes	no	Hydrophilidae:	yes	no
Fish	yes	no	Dytiscidae:	yes	no
Frogs	yes	no	Corixidae:	yes	no
Salamanders	yes	no	Notonectidae:	yes	no
Waterfowl	yes	no	Belostomatidae:	yes	no
Other (specify) _____			Other (specify) _____		

Voucher Specimens

Specimens shall be preserved according to the standards of the institution in which they will be accessioned.

<u>Species</u>	<u># Individuals</u>	<u>Accession/Catalog #</u>	<u>Pool #</u>
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Collection, Preservation, Handling, and Accessioning Information for Small Crustaceans

Crustacea Section, Invertebrate Zoology
The Natural History Museum of Los Angeles County
900 Exposition Boulevard
Los Angeles, California 90007

Collection Data

To the extent possible, the following data should be included. The Museum reserves the right to refuse acceptance of any specimens without a minimum of usable, legible collection data. Archival quality materials (including glass vials, permanent ink or pencil and permanent label paper, and glass outer jars with screw-top polypropylene lids) should always be used (see below). All collections should include the following information:

- Taxon name: (Lowest available or known, down to species where possible)
- Date: (day, month, year)
- Time of Day: (if known)
- Detailed Location:
- Latitude and Longitude:
- Specific habitat information:
- Name of collector:
- Collecting method(s) / device(s):
- Preservative used:
- Notes: (to include any observations on behavior, co-occurring species, etc.)

Preservation

Ideally, even small crustaceans should be initially fixed in 5 to 10% formalin (37% formaldehyde in solution, as commercially purchased, mixed with 90-95% water). As an alternative, 100% ethyl alcohol, although not a fixative and so not as good for long term tissue preservation, can sometimes be used (not recommended for animals longer than 20 mm total length). With either method, specimens should be transferred to 70% ethyl alcohol (ethanol) after a minimum of 8 hours of fixation. The 70% ethanol to tissue ratio should be approximately 3 to 1 for long term storage.

Storage

Archival quality materials (including glass vials, permanent ink or pencil and permanent label paper, and glass outer jars with screw-top polypropylene lids) should always be used. Specimens should be placed in small glass vials completely filled with 70% ethanol and plugged with cotton (not foam). Vials are then inverted and stored in a slightly larger outer storage jar of glass or plastic, also filled with 70% ethanol and fitted with a polypropylene-closure lid. Labels are ideally situated in the outer jar containing the vial rather than in the shell vial, never on the outside of the jar or affixed to the lid.

Shipping

Specimens should be shipped in plastic, leak-proof bottles, jars, or vials, and must be adequately cushioned by bubble-wrap, plastic peanuts, etc. to ensure their safe arrival. It is preferred that specimens that are designated types or vouchers be sent by registered or certified mail, although this is at the discretion of the sender. Use the complete address given at the top of this document.

Cost of Specimen Accessioning

Because of the rising costs of accessioning and maintaining valuable collections, the Natural History Museum reserves the right to charge on a per-sample basis for accessioning collections. This fee varies with the size of the collection, duration of the project, and availability of Museum staff at the time of deposition. The fee may be waived at the discretion of the Curator or Collections Manager of Crustacea and may fluctuate depending upon our evaluation of lots received.

Accessioning Information

The Natural History Museum of Los Angeles County will accept for permanent care and curation selected collections of Crustacea, including those from vernal pools and other ephemeral freshwater habitats and representatives of threatened or endangered taxa. The Museum is willing to act as the repository for collections acquired during USFWS or other surveys.

To be accepted for accessioning, the collections must be in reasonably good shape, meaning that the animals themselves must not be overly deteriorated and that all previously stated collecting, preserving, and labeling protocols have been followed. Furthermore, all collections must be accompanied by a detailed list of the specimens being sent.

The Museum reserves the right to charge an accessioning fee to cover the costs of accessioning any and all deposited specimens. This fee may be waived at the discretion of the curator in charge of the Museum Section that will be overseeing the accessioning and curation of the collection.

The Museum reserves the right to decide whether an incoming collection should be stored topically vs. separated and stored according to taxonomic divisions (i.e. storing all members of one family together rather than keeping all collections from one site together).

The Museum further reserves the right to decide which specimens will be kept and maintained for long term storage and which may be passed on to other institutions in exchange or as long term loans for research purposes.

For further information contact: (Or write to the address given above)

Dr. Gary Pettit, Collections Manager, Crustacea	213-744-3450 fax 746-2999
Dr. Joel W. Martin, Curator of Crustacea	213-744-3440 fax as above

California Academy of Sciences
Department of Invertebrate Zoology and Geology
Golden Gate Park
San Francisco, CA 94118

October 1995

Protocols and standards for preservation and archival of vernal pool crustaceans.

Specimens of vernal pool crustaceans listed as endangered or threatened by the U.S. Fish and Wildlife Service (USFWS) and collected during surveys permitted by the USFWS may be deposited as voucher specimens at the California Academy of Sciences, Department of Invertebrate Zoology and Geology (CASIZG). However, only those specimens which have been properly fixed, preserved and documented will be accepted for archival. The vendors listed below can supply the necessary materials for specimen storage, however these vendors are not specifically required and materials from other sources will be acceptable provided they meet the standard requirements of CASIZG.

Any questions regarding these standards and protocols may be directed to Dr. Robert Van Syoc, Senior Collection Manager of invertebrates at CASIZG (415-750-7082). Visits to the collection to deposit potential voucher specimens must be at least 7 days in advance. Specimens may be shipped to CASIZG, but shipments with damaged specimens or broken containers will not be accepted. Each shipment must be accompanied by a packing list of specimens sent. CASIZG catalog numbers will be assigned by CAS staff and notification sent to you by U. S. mail. This will be done in an expeditious manner, but staffing limitations may cause delays. Therefore, allow several days for notification of CASIZG catalog numbers.

Materials required:

- 100% or 95% non-denatured ethanol
- 75% non-denatured ethanol (diluted from 100% or 95% with de-ionized or distilled water)
- 2 dram, 4 dram, 6 dram glass shell vials
- Clean cotton
- 8 oz. tall flint glass bottles, 48 mm aperture (inside diameter) or 32 oz. glass *bottles*, 74 mm aperture (inside diameter)
- White polypropylene screw-top closures with solid (no holes) smooth surface, 58 mm diameter (8 oz. bottles) or 85 mm diameter (32 oz. bottles), with foam or plastic liners
- Nalgene polypaper
- Dot-matrix printer and alcohol-proof ink ribbons, or technical pen with alcohol-proof ink, or #2 pencil

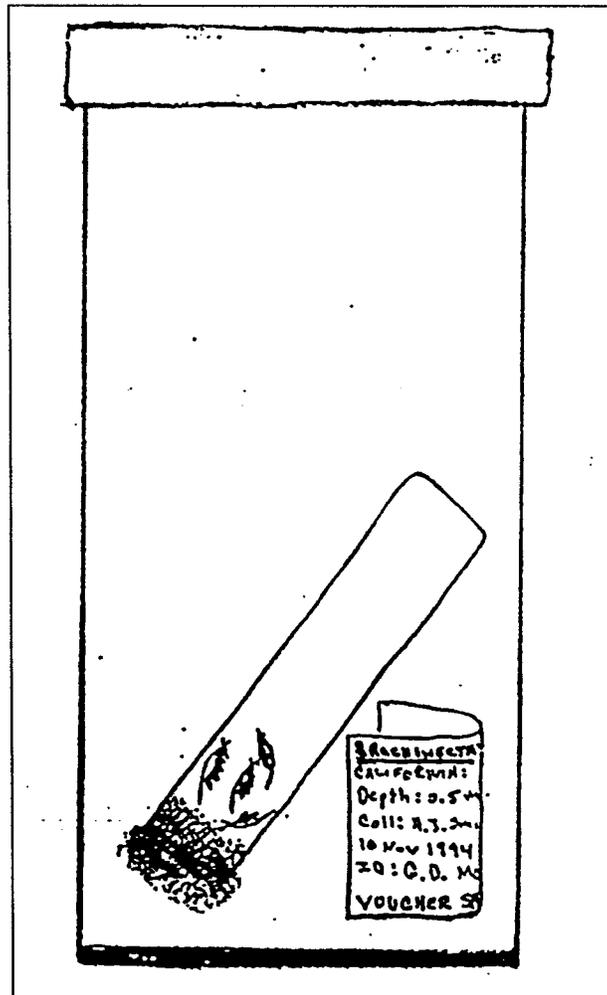
Standards and Protocols:

1. Vernal pool crustaceans must be fixed in 100-95% non-denatured ethanol and preserved for archival in 75% non-denatured ethanol. Enough 100-95% ethanol should be used in the initial fixation to insure proper fixing of tissues. A ratio of at least 10 parts 100-95% ethanol to 1 part tissue is required for initial fixation. A ratio of at least 3 parts 75% ethanol to 1 part tissue is required for preservation.
2. All specimens must be sorted by collecting event (each locality/date/time of collection). They must be identified to species level, each species from each collecting event placed into a vial or vials in it's own 8 or 32 oz. bottle (use the smaller size if possible).
3. Specimens are placed into 2 dram, 4 dram, or 6 dram glass shell vials filled with 75% ethanol. The vial or vials are plugged with clean cotton in such a manner that no air bubbles are trapped inside and placed inverted into an 8 or 32 oz. glass bottle filled with 75% ethanol (Fig. 1). If open vials with specimens are inserted upright into the larger container, then plugged with cotton, air bubbles will not be trapped in the vial. The vial may then be removed and placed back into the bottle with cotton plug down for archival. It is important to remember that the specimens should not be jammed into the vials. The purpose of placing specimens into vials is to protect them from potential damage which could be caused by contact with labels placed into the jar or during removal from the 8 or 32 oz. container. However, putting too many specimens into a vial or putting specimens into a vial which is too small will damage them. The required ratio of preservative to tissue inside the vial is at least 3 parts 75% ethanol to 1 part tissue. This may require splitting a species sample from a single collecting event into two or more vials within a bottle or even into two bottles.
4. The 8 or 32 oz. glass bottle is capped with the foam or plastic lined, screw-top polypropylene closure.
5. Each 8 or 32 oz. bottle must contain a label with collecting event data on Nalgene polypaper in alcohol-proof ink or #2 pencil. Labels must be placed into the specimen bottle which contains the specimen vial(s), not directly inside the vials and not attached to the outside of the bottle. The data may be printed using a dot-matrix printer with alcohol-proof ink ribbon. Alternatively, it may be hand printed with technical pen using alcohol-proof ink or a #2 pencil. Laser printed or photocopied labels are not acceptable. All labels must be easily readable by CAS staff. If labels are not legible, specimens will not be accepted or cataloged into the CAS collection. Labels should be no larger than 3 x 5 inches and no smaller than 2 x 3 inches.

Data required for specimen labels:

- Species name
- County, city/town, and other clearly worded description of collection locality so as to enable another scientist to find the collection locality
- Latitude and longitude
- Environmental data regarding habitat (temperature, turbidity, depth and size of pool)
- Full names of collector(s) and identifier
- Dates of collection and identification, dates should clearly indicate day, month and year (e.g. 10 Jan 1995)
- The phrase "Voucher specimen: Vernal Pool Crustacean Survey"

Fig. 1: 8 oz. bottle containing inverted glass vial plugged with cotton.
Note label inside jar, but not inside vial.



List of potential (not specifically required) vendors of some required materials.

Glass vials: S-930	Acme Vial and Glass 1601 Commerce Way Paso Robles, CA 93446 (805) 239-2666
Glass bottles: and polypropylene lids	California Glass 155 98th Ave. Oakland, CA 94603 (510) 635-7700
Polypropylene lids:	Berlin Packaging 7900 Edgewater Dr. Oakland, CA 94621 (510) 562-7201
Cotton: non-sterile	California Medical Supplies 3315 Broadway Oakland, CA (510) 885-5105
Nalgene Polypaper:	VWR Scientific (415) 468-7150 (800) 932-5000
Alcohol-proof ("non-bleeding") printer ribbons:	Automated Office Products Inc. 9700-A Martin Luther King Jr. Hwy. Lanham, MD 20708
Non-denatured ethanol 190 or 200 proof (95% or 100%)	Gold Shield Chemical 3111 Depot Rd. Hayward, CA 94545 510-782-2040

Materials may be obtained from other sources, but should conform to the specific standards listed above. CASIZG will not act as a supplier of materials.

Field survey forms and information regarding the California Natural Diversity Database can be accessed on the internet at <http://www.dfg.ca.gov/whdab/cnddb.htm>.

State of California • The Resources Agency
Department of Fish and Game • Wildlife & Habitat Data Analysis Branch
The California Natural Diversity Database
Commonly Asked Questions

What is the California Natural Diversity Database (CNDDDB)?

The CNDDDB is a program within the Department of Fish and Game's Habitat Conservation Division and within the Wildlife & Habitat Data Analysis Branch. The CNDDDB's mission is to track the location and condition of California's many species of rare and sensitive plants, animals, and natural communities (e.g., marshes, riparian systems, desert scrub, etc.). These species and natural communities are collectively referred to as "elements."

The CNDDDB includes in its inventory all federally and state listed plants and animals, all species that are candidates for listing, all species of special concern, and those species that are considered "sensitive" by government agencies and the conservation community. This is a computerized inventory and information is available for a fee in hard copy and digital forms. The CNDDDB is a dynamic system with information continually being added and upgraded. The CNDDDB contains over 36,000 locational records for over 3,000 elements.

How is CNDDDB information set up or organized?

CNDDDB data are organized geographically and taxonomically. Information is retrieved by United States Geological Survey (USGS) map sheet (e.g., typically 1:24,000, 1:100,000, or 1:250,000 scale), or by taxa. Most CNDDDB clients request information for USGS 7.5U minute quads. The approximately 49 square miles covered by a single USGS 7.5U minute quad is the smallest area for which we will perform a data retrieval. Due to the nature of our inventory, it is important that our clients query surrounding quads as well as the quads on which their project site or area of interest is located.

What types of information can I obtain?

OVERLAYS & TEXT We can produce computer generated overlays for the 1:24,000-, 1:100,000-, or 1:250,000-scale base maps. Text reports are included only with the USGS 7.5' scale overlays. An Element Table on the USGS 7.5' (1:24,000) overlay provides the following information for each element occurrence: a map feature number, occurrence number, map index number, element code, accuracy class, element count, the common and scientific names, numbers of components, and legend. Most of our clients request overlays for USGS 1:24,000 and 1:100,000 scale maps (map index numbers only with legend for 1:100,000 scale). Overlays cost \$30 (standard vellum media) per quad which include text reports, except for RAREFIND subscribers (see below).

RAREFIND 2 - We can also make our data available via a microcomputer database application called RAREFIND 2. You can obtain our entire statewide data set. RAREFIND 2 is available on a yearly subscription basis. The cost for the statewide data set is \$1,250 for government agencies and nonprofit conservation organizations or \$2,500 for commercial clients. A subscription includes an initial set of data with the RAREFIND 2 application followed by an updated data set 6 months later. The GIS digital layer is also available to subscription customers. Renewing customers are given a 10% discount.

RAREFIND 2 subscribers are also afforded a special overlay price of \$20 per quad. RAREFIND 2 is a compiled, stand alone application that requires a 386 or higher series PC, with 560 K free DOS memory and 100 MB free hard disk space. RareFind 2 will run on M S-DOS version 5.0 or higher, Windows 3.1, Windows 95 or NT. No additional software is required.

How do I order information from the CNDDDB?

It is easy to request information from the CNDDDB. Call one of our Information Services staff at (916) 324-3812 to place your order by phone or e-mail us at kbates@dfg.ca.gov. It is most helpful to have the name or names of the 7.5' quad maps for which you want information contact us. We will give you a cost estimate before we proceed with your request.

How long does it take to get information from the CNDDDB?

The usual turn around time for data requests is one to two weeks. We ask you to remember that this is a computerized system and it does go down from time to time. Such unforeseen event can interfere with our normal response time.

How do I pay?

You are invoiced directly from our accounting department after the products have been sent to you. You do not need to pay up front; but invoices are due and payable upon presentation—no terms are available. Delinquent accounts will be denied additional services until the balance has been paid.

NOTE: There is a 50% cancellation charge if you cancel your order after we have already processed your request and generated our products. There is a no-return policy on products already delivered.

Why is there a charge for this information?

Our enabling legislation requires that we "insure cost-sharing by all who use the CNDDDB, and develop a fee structure to recover actual costs" for its use. The Department of Finance has determined that this will include not only direct costs for generating and distributing our data, but will also include some program overhead. We recover about \$225,000 per year in fees, which amount to about 25% of our program costs.

The Wildlife & Habitat Data Analysis' Mission and Vision:

“ ..to provide high quality scientific information, tools, and expertise needed by Department employees, other public agencies, private organizations, and the public for making informed conservation decisions regarding our biological resources. ...to serve as the State's clearinghouse for biological data and center for conducting conservation analyses at statewide, regional, and local scales and actively acquire, integrate, improve, and distribute biological resource data and associated spatial data in support of conservation policy and planning needs.”

NDDDB Questions & Answers.wpd//Rev:1/26/00
(from <http://www.dfg.ca.gov/whdab/cnddb.htm>.)