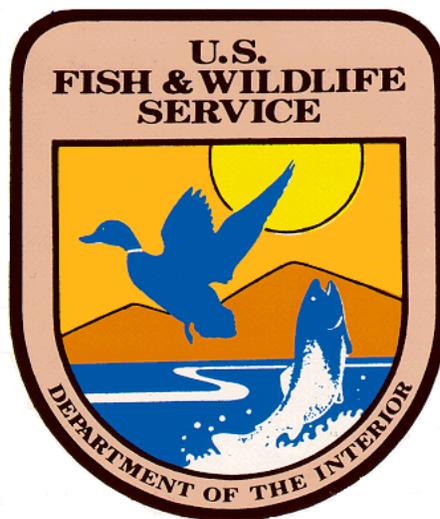


Draft
Programmatic Environmental Assessment
Anadromous Fish Restoration Actions in
Lower Deer Creek
Tehama County, California



Prepared For
Sacramento-San Joaquin Estuary
Fishery Resource Office
U.S. Fish and Wildlife Service
Stockton, California

Prepared By
Sacramento Fish and Wildlife Office
U.S. Fish and Wildlife Service
Sacramento, California

December 1999

DRAFT
FINDING OF NO SIGNIFICANT IMPACT

Anadromous Fish Restoration Actions in the Lower Deer Creek Watershed

Lead Federal Agency:
U.S. Fish and Wildlife Service
2800 Cottage Way, W-2605
Sacramento, California 95825

The U.S. Fish and Wildlife Service (Service) proposes to fund cooperative actions in the lower Deer Creek watershed to protect, enhance, and restore anadromous fisheries and their habitats, while maintaining an equitable balance among other land and water uses such as agriculture, municipal and industrial needs, flood control, and recreation. The Proposed Actions evaluated in this Programmatic Environmental Assessment (PEA) include many of those recommended in the Central Valley Project Improvement Act's (CVPIA) Anadromous Fish Restoration Program (AFRP) to augment cumulative efforts to at least double populations of anadromous fish in Central Valley streams.

Project Description

The action area for lower Deer Creek extends 11.6 miles from the confluence with the Sacramento River, near the town of Vina, upstream to the Deer Creek Irrigation District dam. The Proposed Actions would be based upon willing landowner participation and include the following: 1) land conservation, 2) fish screens, 3) fish passage, 4) spawning gravel replenishment, 5) channel and instream habitat modification, 6) streambank modification, 7) riparian revegetation, 8) meander belt and floodplain management, 9) agricultural management, 10) road management, and 11) monitoring. Mitigation and conservation measures have been incorporated to avoid or minimize adverse effects to the human environment.

Alternatives

The PEA addressed two alternatives: the No Action Alternative, in which the Service would not provide AFRP funds for watershed actions, and the Proposed Actions Alternative, in which the Service would fully or partially provide AFRP funds for the specified actions. The No Action Alternative was not selected because it would allow continued incremental deterioration of spawning habitat, leading to further declines in natural spawning activity and inhibit the recovery of salmonids in the lower Deer Creek.

Environmental Impacts

Based upon information contained in the PEA, we have determined that this Federal action would not significantly affect the quality of the human environment. A summary of the reasons for a Finding of No Significant Impact is as follows:

1. No significant adverse impacts to federally listed species are expected because associated mitigation and conservation measures have been incorporated into the Proposed Actions. Instream construction activities would be timed to avoid or minimize disturbances during spawning, rearing, and migration periods for anadromous salmonids. Beneficial effects from the Proposed Actions may increase the natural production of salmonids in the watershed.
2. Temporary minor impacts to vegetation may occur; however, staging sites and access routes would avoid or minimize negative impacts on native riparian vegetation. Other mitigation measures would ensure that incidental adverse effects to vegetation are minimized and mitigated. Implementation of the Proposed Actions may increase riparian vegetation and provide a net beneficial effect.
3. Short-term minor impacts to fish and wildlife are likely to occur from project implementation. However, procedural guidelines would be followed and construction timed to minimize incidental disturbance to wildlife. Wildlife habitats such as vegetation, cavities, dens, and burrows would be avoided to the greatest extent possible. The revegetated floodplain may increase wildlife habitat diversity.
4. Minor, short-term impacts are expected to occur to water quality, hydrology, and air quality and project sites during construction. However, the Proposed Actions may have beneficial effects on water temperatures, water quality, creek hydrology, and salmonid spawning habitat.
5. The Proposed Actions are not expected to have any significant adverse effects on wetlands and floodplains, pursuant to Executive Orders 11990 and 11988. The Proposed Actions support the preservation and enhancement of the natural and beneficial values of floodplains. No net loss of wetland or aquatic habitat will occur.
6. Construction activities may have temporary adverse effects on recreation in the project area. To minimize exposure to nearby recreationists, all public safety precautions would be implemented, landowners and locals would be informed prior to construction activities, and signs would be posted near access routes. Construction activities would be limited to weekdays whenever possible, and would be completed as soon as possible to minimize impairment of recreational opportunities during construction.

7. There would be no long-term, adverse impacts to social and economic conditions resulting from the Proposed Actions. Implementation of the Proposed Actions may enhance aesthetic values of the local communities.
8. None of the project features would result in short- or long-term adverse effects to human health or the environment, result in disproportionate adverse effects to low-income or minority populations, or alter social or economic conditions in the region.
9. No adverse effects to cultural resources are expected because site-specific projects would only commence upon compliance with the Cultural Resources Programmatic Agreement between the Service, the California State Historic Preservation Office and the Advisory Council for Historic Preservation. If any cultural resources are discovered during the project, work will halt and the Service's Regional Archaeologist will be contacted.
10. No Indian Trust Assets have been identified within the project area. Local Native Americans have been contacted and were given the opportunity to comment on the project.
11. The Proposed Actions would be implemented in a phased approach and based on willing landowner participation. The use of adaptive management would tend to spread implementation of approved actions over time. The temporary and minor adverse effects that may occur at construction sites would not be expected to substantially accumulate throughout the watershed, because only a few of the actions would likely be implemented in any single year and all actions would incorporate mitigation and conservation measures. Cumulative actions to improve stream corridor habitats throughout the watershed may provide benefits to associated vegetation and wildlife, but the benefits would not be substantial relative to the overall restoration efforts needed to improve salmonid habitat within the watershed.
12. Additional activities related to salmonid habitat improvement may be funded through programs other than the AFRP, but the objectives of these programs would likely overlap with the Proposed Actions. The effects of the Proposed Actions in combination with these other potential activities would not be expected to substantially exceed overall cumulative effects identified for the watershed, or that would otherwise occur throughout the Central Valley over the 10-year life of the EA.

Therefore, it is my determination that the proposal does not constitute a major Federal action significantly affecting the quality of the human environment under the meaning of section 102(2)(c) of the National Environmental Policy Act of 1969 (as amended). As such, an Environmental Impact Statement is not required. A PEA has been prepared in support of this finding, and is available upon request to the U.S. Fish and Wildlife Service, Sacramento Fish and Wildlife Office, 2800 Cottage Way, W-2605, Sacramento, CA 95825.

Manager, California/Nevada Operations Office

Date

Proposal Coordination:

U.S. Fish and Wildlife Service (Lead Agency)

Sacramento Fish and Wildlife Office, Sacramento, CA

Sacramento-San Joaquin Estuary Fishery Resources Office, Stockton, CA

Sacramento Realty Field Office, Sacramento, CA

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Region I Division of Habitat Protection and Management

National Marine Fisheries Service, Santa Rosa, CA

U.S. Forest Service, Lassen National Forest, Susanville, CA

U.S. Bureau of Land Management, Redding Resource Area, Redding, CA

Natural Resources Conservation Service

U.S. Bureau of Reclamation, Mid-Pacific Region, Sacramento, CA

California Department of Fish and Game

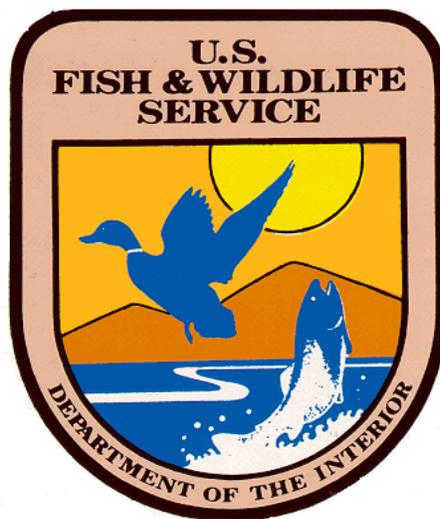
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Deer Creek Watershed Conservancy

The Nature Conservancy, Red Bluff, CA

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CONTENTS

| | | |
|-----|---|----|
| 1.0 | INTRODUCTION | 1 |
| | PURPOSE AND NEED | 2 |
| 2.0 | ALTERNATIVES | 5 |
| | NO ACTION ALTERNATIVE | 5 |
| | THE PROPOSED ACTIONS | 5 |
| | DEVELOPMENT OF THE PROPOSED ACTIONS | 5 |
| | ACTION DESCRIPTIONS | 9 |
| 3.0 | AFFECTED ENVIRONMENT | 20 |
| | Vegetation and Wildlife | 20 |
| | Fisheries and Water Quality | 23 |
| | Special Status Species | 26 |
| | Hydrology and Stream Channel | 26 |
| | Air Quality and Noise | 28 |
| | Cultural Resources | 29 |
| | Socioeconomic Conditions And Land Use | 29 |
| | Recreation | 29 |
| 4.0 | ENVIRONMENTAL CONSEQUENCES | 31 |
| | Vegetation and Wildlife | 31 |
| | NO ACTION ALTERNATIVE | 31 |
| | PROPOSED ACTIONS | 31 |
| | Fisheries and Water Quality | 33 |
| | NO ACTION ALTERNATIVE | 33 |
| | PROPOSED ACTIONS | 33 |
| | Special Status Species | 35 |
| | NO ACTION ALTERNATIVE | 35 |
| | PROPOSED ACTIONS | 35 |
| | Hydrology and Stream Channel | 40 |
| | NO ACTION ALTERNATIVE | 40 |
| | PROPOSED ACTIONS | 40 |
| | Air Quality and Noise | 41 |
| | NO ACTION ALTERNATIVE | 41 |
| | PROPOSED ACTIONS | 41 |
| | Cultural Resources | 41 |



| | | |
|-----|---|----|
| | NO ACTION ALTERNATIVE | 41 |
| | PROPOSED ACTIONS | 41 |
| | Socioeconomic Conditions and Land Use | 42 |
| | NO ACTION ALTERNATIVE | 42 |
| | PROPOSED ACTIONS | 42 |
| | Recreation | 44 |
| | NO ACTION ALTERNATIVE | 44 |
| | PROPOSED ACTIONS | 44 |
| 5.0 | CUMULATIVE IMPACTS | 46 |
| | PROPOSED ACTIONS | 46 |
| | RELATED ACTIVITIES | 47 |
| 6.0 | ENVIRONMENTAL COMPLIANCE | 52 |
| 7.0 | PUBLIC INVOLVEMENT | 59 |
| | COORDINATION AND CONSULTATION | 60 |
| | PREPARERS AND CONTRIBUTORS | 61 |
| | REFERENCES | 62 |

TABLES



Table 1. Total estimated acres of land use types¹ within a 600-ft-wide corridor (300 ft from each bank) along Deer Creek from the Deer Creek Irrigation Dam to its confluence with the Sacramento River. 9

Table 2. Noise levels correlated with land use categories ranging from undeveloped rural to urban (CALFED 1999c). 29

Table 3. Total estimated acres of land use types within a 600-foot-wide corridor (300 feet from each bank) along Deer Creek from the Deer Creek Irrigation Dam to its confluence with the Sacramento River, compared to total estimated acres within Tehama County. 43

FIGURES

Figure 1. Deer Creek Watershed 3

Figure 2. PEA Deer Creek Action Area, Mouth Reach and Valley Reach 4

Figure 3. Deer Creek Anadromous Salmonid Migration Calendar 25

APPENDICES

Appendix A. Associated mitigation and conservation measures A-1

Appendix B. Federal special status species in the Deer Creek Action Area B-1

Appendix C. California State special status species in the Deer Creek Action Area C-1

Appendix D. Summary of potential effects and associated mitigation and conservation measures. Mitigation and conservation measures are defined in Appendix A. D-1

Appendix E. Common and scientific names of species listed in the text E-1



LIST OF ACRONYMS

| | |
|--------|--|
| AFRP | Anadromous Fish Restoration Program |
| BLM | Bureau of Land Management |
| CALFED | California Bay-Delta Program |
| CAMP | Comprehensive Assessment and Monitoring Program |
| CDFG | California Department of Fish and Game |
| CDWR | California Department of Water Resources |
| CEQA | California Environmental Quality Act |
| CESA | California Endangered Species Act |
| CVPIA | Central Valley Project Improvement Act |
| DCID | Deer Creek- Irrigation District |
| DCWC | Deer Creek Watershed Conservancy |
| EA | Environmental Assessment |
| EQIP | Environmental Quality Incentives Program (NRCS) |
| ERPP | CALFED Environmental Restoration Program Plan |
| ESA | Federal Endangered Species Act of 1973, as amended |
| FEMA | Federal Emergency Management Agency |
| FONSI | Finding of No Significant Impact |
| FWCA | Fish and Wildlife Coordination Act |
| LRMP | Lassen Land and Resource Management Plan (U.S. Forest Service) |
| NEPA | National Environmental Policy Act |
| NHPA | National Historic Preservation Act |
| NMFS | National Marine Fisheries Service |
| NRCS | Natural Resources Conservation Service |
| PEA | Programmatic Environmental Assessment |
| RMP | Redding Resource Management Plan (BLM) |
| RWQCB | Regional Water Quality Control Board |
| SHPO | California State Historic Preservation Officer |
| SRA | Shaded Riverine Aquatic Habitat |
| SVRIC | Stanford-Vina Ranch Irrigation Company |
| SWRCB | State Water Resources Control Board |
| USBR | U.S. Bureau of Reclamation |
| USDA | U.S. Department of Agriculture |
| USEPA | U.S. Environmental Protection Agency |
| USFWS | U.S. Fish and Wildlife Service |
| VELB | Valley Elderberry Longhorn Beetle |
| WHIP | Wildlife Habitat Incentives Program (NRCS) |



1.0 INTRODUCTION

This programmatic environmental assessment (PEA) was prepared by the U.S. Fish and Wildlife Service (Service). The PEA was developed to assist agencies in planning and decision making for restoration of anadromous fisheries and associated habitat within the lower Deer Creek watershed, and to exchange information with stakeholders and the general public during the planning process. The actions evaluated in this document could be fully or partially funded by Federal agencies or require Federal permits and approvals. Therefore, environmental documentation under the National Environmental Policy Act (NEPA) is required. As a programmatic-level NEPA document, the PEA serves as an "umbrella" for addressing a series of actions that are part of a larger goal. The PEA is broad and general in scope and covers direct, indirect, and cumulative effects that can be identified without undue speculation. It is especially important in evaluating "system-wide" impacts of multiple actions.

The PEA covers effects of potential actions identified under several planning programs involving Federal, State, and public entities that address protection, enhancement, and restoration of aquatic and riparian habitats within the Central Valley, Sacramento Valley, and Deer Creek watershed. These programs have produced the Upper Sacramento River Fisheries and Riparian Habitat Management Plan (California Resources Agency 1989), Restoring Central Valley Streams: A Plan For Action (CDFG 1993), the Revised Draft Restoration Plan for the Anadromous Fish Restoration Program (AFRP) (USFWS 1997), and the CALFED Bay-Delta Ecosystem Restoration Program Plan (CALFED 1999a, b), among others. Additional programs for the Deer Creek watershed are under development by stakeholder organizations including the Deer Creek Watershed Conservancy (DCWC), an active local non-profit landowner group, the Nature Conservancy, California Waterfowl Association, and other affiliated stakeholder groups. The principles and goals of these programs overlap, and provide the basis for the Proposed Actions.

The Proposed Actions are supported by the AFRP, which may provide entire or partial financing for habitat restoration actions. Successful implementation of fisheries restoration on lower Deer Creek depends heavily on local involvement and partnerships with property owners, watershed workgroups, public and private organizations, county and local governments, and State and Federal agencies. For efficiency, the AFRP will coordinate with other restoration programs and supplemental sources of funding.

The Proposed Actions include only potential "restorative" actions (modification or establishment of habitat or structures). Potential actions that are "administrative" (planning, education, negotiations, water management, legal proceedings, law enforcement) are included only in the PEA's Related Activities and Cumulative Effects sections. Actions involving water purchase and water rights acquisition are excluded, as they are to be addressed by other restoration programs.

Deer Creek is one of the few remaining streams which supports native strains of the Central Valley spring-run chinook salmon (*Oncorhynchus tshawytscha*), a species federally listed as threatened under the Endangered Species Act of 1973, as amended (ESA). Lower Deer Creek



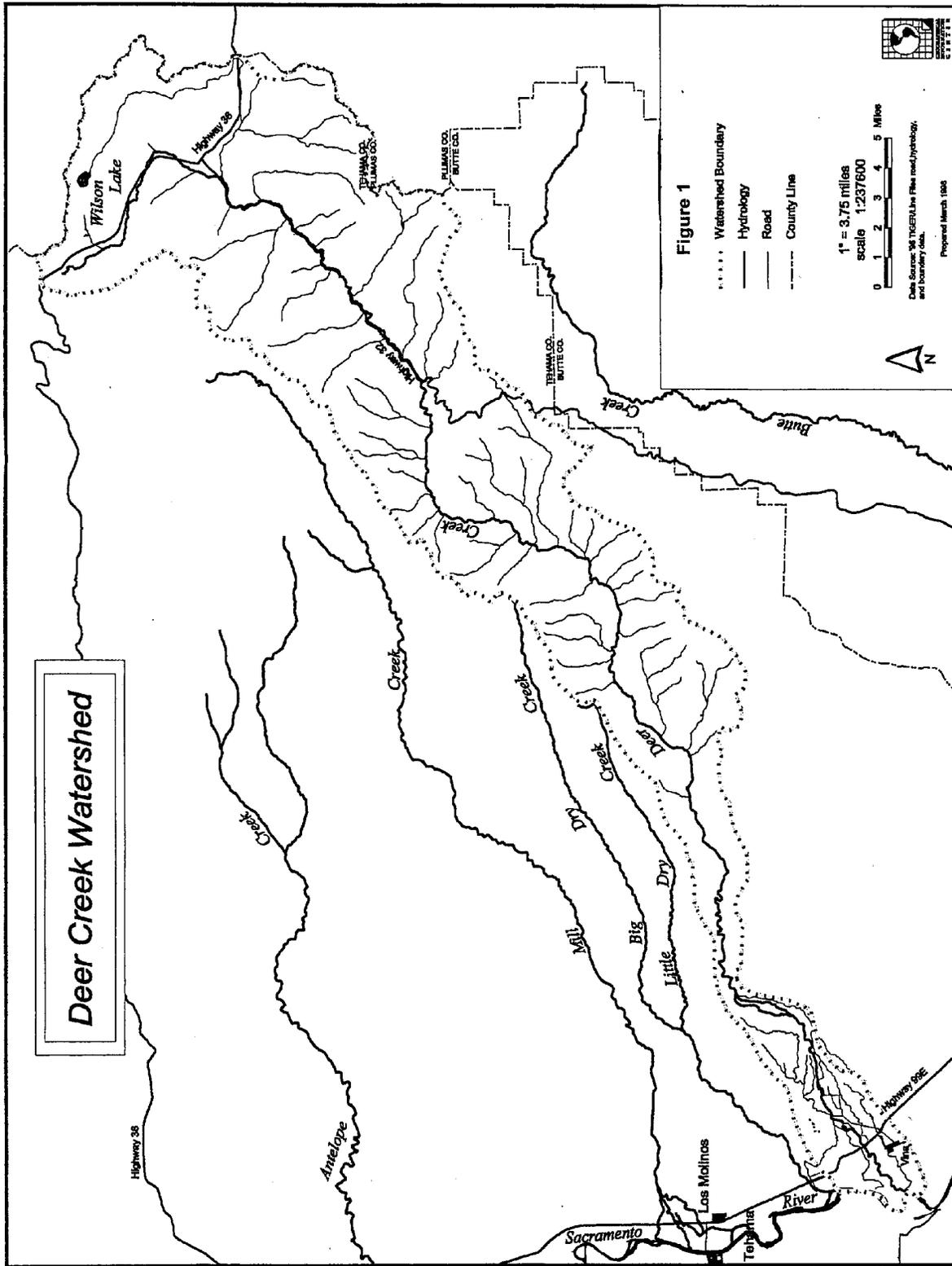
has been identified as having one of the highest potentials for spring-run chinook salmon restoration within the Sacramento Valley. Steelhead and other native fishes also are found in Deer Creek. Due to Deer Creek's current relatively undisturbed habitat, distance from large population centers, and absence of any major dams to obstruct fish passage, Deer Creek has maintained much of the natural qualities of the watershed.

PURPOSE AND NEED

Major modifications of the Central Valley aquatic ecosystem began during the first major settlement of California that followed the 1849 gold rush. Since then, an estimated 95% of historical salmon and steelhead trout habitat in Central Valley streams and tributaries has been lost due to habitat degradation and blockage by dams (Reynolds et al. 1993 and USBR 1997). Riparian habitat, which provides a variety of critical functions in stream ecosystems for fisheries and terrestrial wildlife, has been reduced to only 5% of its historical extent along the Sacramento River (CA Resources Agency 1989), and 5-15% on tributary streams (Mills and Fisher 1993). Virtually all species and races of Central Valley anadromous fish have declined to record low levels in recent years and some have been extirpated from areas in which they evolved (Reynolds et al. 1993).

The purpose for taking action in lower Deer Creek is to protect, enhance, and restore to the maximum extent possible the watershed's anadromous fisheries and their habitats, while maintaining an equitable balance among other land and water uses such as agriculture, municipal and industrial needs, flood control, and recreation. This would be conducted on a willing provider basis as opportunities permit through cooperation among Federal and State agencies, watershed planning groups, private landowners, and other stakeholders. These efforts within the Deer Creek watershed would contribute toward the implementation goals of several existing Central Valley fish and wildlife restoration plans to create a healthier, more-natural functioning ecosystem; enhance and restore aquatic and riparian habitats; protect threatened and endangered species; and augment cumulative efforts to at least double populations of anadromous fish in Central Valley streams.





2.0 ALTERNATIVES

NO ACTION ALTERNATIVE

The No-Action Alternative is used as a basis for comparison of the Proposed Actions. The No-Action Alternative includes the actions, practices, and land uses that would be assumed to occur in lower Deer Creek without Federal funding authorized by the Central Valley Project Improvement Act (CVPIA) section 3406(b)(1). Under the No-Action Alternative, actions taken to enhance and preserve these habitats would be fewer, and would more likely be necessitated by environmental protection laws, such as the ESA and the California Endangered Species Act (CESA), respectively, and water quality regulations. Implementing measures to enhance and protect the watershed would depend on alternative funding sources, such as from individual land owners, nonprofit organizations, State and local governments, and other Federal sources.

THE PROPOSED ACTIONS

The set of Proposed Actions is a departure from traditional alternatives. Rather than develop multiple alternatives of discrete actions and their abilities to fulfill the stated Purpose and Need, a composite of Proposed Actions was developed to maximize flexibility and opportunities to restore anadromous fisheries and their habitats. As opposed to traditional alternatives to be wholly implemented, the Proposed Actions could be either partially or comprehensively implemented on an incremental basis. Proposed Actions would need to be implemented over a 10-year period – the life of the PEA. After 10 years, the environmental baseline would require reassessment to consider implemented actions and other influences before continuing additional actions.

The incremental approach incorporates concepts of adaptive management, whereby, actions most likely to achieve objectives are implemented first and monitored. Modifications or supplemental actions are subsequently implemented depending on monitoring results. The incremental approach also has advantages of flexibility in handling unforeseen circumstances, and when working through partnerships, which may or may not be fully developed prior to environmental analysis. Because all Proposed Actions depend on willing landowners, commitments to specific actions and sites will depend on where opportunities exist. By covering the broad range of proposed actions in the environmental analyses, individual actions can be proposed for implementation as sites are selected, to best meet restoration needs in lower Deer Creek.

DEVELOPMENT OF THE PROPOSED ACTIONS

Several past and present planning programs have contributed to the development of the Proposed Actions. The Proposed Actions are consistent with recommendations for Deer Creek in the AFRP Draft Restoration Plan (Plan) of 1995. This Plan was synthesized by the AFRP from pre-



existing restoration strategies and newly acquired information from several sources, including the AFRP Working Paper (USFWS 1995a,b,c), public and private organizations, and individual contributors. The Working Paper; developed under direction of a scientific Core Group represented by the Service, California Department of Fish and Game (CDFG), U.S. Bureau of Reclamation (USBR), National Marine Fisheries Service (NMFS), U.S. Environmental Protection Agency (USEPA), and California Department of Water Resources (CDWR); incorporated the best available science and sources to identify factors potentially limiting natural production of anadromous fish, and a comprehensive list of restoration actions.

The Plan, released for public review in December, 1995, presented potential restoration actions deemed reasonable with respect to their technical and legal basis, authority for implementation, and public support. Following further public outreach, the Plan was revised in 1997 (USFWS 1997). The AFRP planning took an ecosystem-level approach that considered the physical environment, biological environment, and human environment. The Plan was intended to comprise a list of actions that, if entirely implemented, would likely meet the AFRP goal of at least doubling the natural production of anadromous fish in the Central Valley rivers and streams by the year 2002. An advantage of ecosystem-level problem-solving is that, in addition to anadromous fish, all other aspects of the environment benefit from restoration actions.

The AFRP states six general objectives that need to be met to achieve the program goal:

- Improve habitat for all life stages of anadromous fish through provision of flows of suitable quality, quantity, and timing, and improved physical habitat;
- Improve survival rates by reducing or eliminating entrainment of juveniles at diversions;
- Improve the opportunity for adult fish to reach their spawning habitats in a timely manner;
- Collect fish population, health, and habitat data to facilitate evaluation of restoration actions;
- Integrate habitat restoration efforts with harvest management; and
- Involve partners in the implementation and evaluation of restoration actions.

The Deer Creek watershed was evaluated as a whole, recognizing the interdependencies of stream hydrology; sedimentation; riparian vegetation; aquatic and terrestrial wildlife, including rare and sensitive species; and human-induced influences. It was understood that only through comprehensive consideration could maximum benefits to anadromous fish be realized. Actions



listed in the Plan for the Deer Creek watershed are the result of this comprehensive investigation, and represent the scientific Core Group's conclusions of what actions are necessary for fisheries restoration in the watershed. It is unrealistic to expect complete restoration of pristine (pre-gold rush) conditions within the action area, because the hydrology within the lower reaches of the Deer Creek watershed has been substantially modified to meet water use needs and much of the adjacent riparian zone and uplands have been converted to suit human land uses.

The local landowners formed the DCWC, a nonprofit conservation organization dedicated to the continued preservation and management of the Deer Creek watershed ecosystem, in 1995. The DCWC cooperated with California State University, Chico staff to produce a Deer Creek Watershed Management Plan in 1998, to implement guidelines based upon local stakeholder's stewardship of the creek (DCWC 1998a).

Eight fundamental strategies are identified in the Watershed Management Strategy (DCWC 1998b):

1. Maintain stream flows necessary for unimpaired fish passage for chinook salmon and steelhead.
2. Maintain the high water quality of Deer Creek.
3. Protect anadromous fish spawning, rearing and holding habitat.
4. Protect and enhance aquatic habitat and streambank vegetation.
5. Manage rangeland for multiple resource protection and enhancement, including forage for livestock, wildlife and propagation of oak woodlands.
6. Maintain the low density agriculturally-based land uses within the watershed.
7. Promote good land stewardship through education.
8. Continue DCWC's role in the on-going management of the Deer Creek watershed.

The actions may be proposed singly or in combinations to accomplish a restoration goal (e.g., land conservation with agricultural management), because the entire watershed ecosystem must be considered when identifying restoration needs. The connectivity and interdependence of watershed systems necessitates this approach and, ideally, would result in watershed improvements that are sustainable through natural processes.

Most actions would require access to reach project sites. Construction of temporary roads could be required to transport equipment, materials, and workers. If a project would require regular maintenance, permanent roads may be necessary. Many actions would require use of heavy



equipment that may include back-hoes, excavators, front-end loaders, bulldozers, large trucks loaded with construction materials, and other machinery. This equipment would be transported to the sites, and operated within a bounded area at the sites. Multiple load hauling may be necessary to deliver or remove materials from the sites.

Specific locations and acreage for many actions are not proposed in order to provide the landowners and natural resource organizations flexibility in conserving and protecting riparian habitat. The acreage actually set aside for conservation would depend upon the willingness of landowners. Priority areas for conservation would be within 300 feet (ft) of stream banks where riparian habitat and the aquatic ecosystem can best be preserved or enhanced. Lands with the greatest amount of stream corridor are also considered priorities. Lands outside of the 300-ft zone may be included for conservation as a contiguous part of the priority area, or when considered essential for enhancement and preservation measures.

The 300-ft width is established upon riparian corridor studies that concluded 300 ft on either side of a stream is the approximate minimum width to maintain vegetative structure for wetland-dependent wildlife (Castelle et al. 1992). This corridor, 300 ft on either side of the streams, serves the purpose of obtaining a representative sample of land types along Deer Creek that could be eligible for Proposed Actions (Table 1). It is not implied that the land area for any particular action would be 300 ft wide. Actual land dimensions involved in implementing actions would be determined and negotiated with landowners on a site-by-site basis.



Table 1. Total estimated acres of land use types¹ within a 600-ft-wide corridor (300 ft from each bank) along Deer Creek from the Deer Creek Irrigation Dam to its confluence with the Sacramento River.

| Land Use Type² | Corridor Total Acreage |
|----------------------------------|-------------------------------|
| Nonflooded Agriculture | 49 |
| Orchard/Vineyard | 103 |
| Grassland | 41 |
| Flats | 8 |
| Riparian Woody | 495 |
| Blue Oak Woodland | 25 |
| Mixed Chaparral | 23 |
| Other | 5 |

¹Source: CDFG et al. 1997; California Gap Analysis 1998. Acreage for land use types was calculated from satellite imagery and should be considered approximate. Because classification of land use types from satellite imagery is approximate, some minor land use types may be missing, and acreage for others may be somewhat over or under represented.

²Nonflooded agriculture is primarily row crops and other nonflooded types; Orchard/Vineyard is primarily almonds, walnuts, and other types; Grassland is managed and natural grasslands; Riparian Woody is primarily riparian forest and scrub; Blue Oak Woodland and Blue Oak/Foothill Pine is primarily used for grazing and open space; Flats are primarily mud flats and sand bars; Other is primarily human developed areas and paved surfaces.

ACTION DESCRIPTIONS

The Proposed Actions fall into categories of 1) land conservation, 2) fish screens, 3) fish passage, 4) spawning gravel replenishment, 5) channel and instream habitat modification, 6) streambank modification, 7) riparian revegetation, 8) meander belt and floodplain management, 9) agricultural management, 10) road management, and 11) monitoring

The geographic scope of the Action Area for lower Deer Creek extends from the confluence, upstream to the Deer Creek Irrigation District dam. This stretch extends 11.6 miles and can be described as two reaches - the Mouth (2.1 miles) and Valley Floor (9.5 miles) Reaches.

1. Land Conservation

Conservation easements, fee title purchases, and other arrangements with willing providers are common and effective means to ensure land management practices are compatible with fish and wildlife habitat. A conservation easement is a nonpossessory interest in real property conveyed by



a landowner to a nonprofit organization (land trust) or government agency for a specified period, often in perpetuity. It is a legal agreement for environmental conservation purposes that places limitations on the use of property, while allowing the landowner specific retained rights and uses that are compatible with conservation. Because vegetation types, management regimes, and conservation needs are particular to each parcel, conservation easements are customized for site specific needs and may affect all or part of a property.

Payments to landowners for easements would be determined from real estate appraisals of fair market value, and land use rights acquired, as provided by the Uniform Appraisal Standards for Federal Land Acquisition, 1973. Rights retained or forfeited largely depend on site specific conservation needs and land use needs of the landowner. Only those rights necessary for protection or restoration of habitat would be obtained by the easement. The more rights that are obtained in an easement, the greater the payment to the landowner. Examples of land use restrictions that could be negotiated are: 1) no alteration of streambeds; 2) no public access to prevent trespass and poaching; 3) use prohibitions on specified pesticides and chemicals; 4) restrictions to livestock grazing (e.g., offstream watering required); 5) limitations to timber harvesting, mining and dredging; and 6) loss of development rights. Conservation easements would target the approximately 600-ft riparian corridor, but may extend to adjacent upland areas as potential benefits warrant.

Title to the land remains in the landowner's name, and the landowner may continue to live on the land, sell it on the open market, and pass it on to heirs. If the land title changes hands, the new owner would be bound by terms of the easement. The land remains under landowner management, while the easement holder is responsible for habitat enhancement, monitoring, and enforcement of terms. Public access is not a requirement of an easement. Public use rights not acquired by the easement would be controlled by the landowner. Property taxes and assessments continue to be paid by the landowner. Long-term management and monitoring of habitat by land trust organizations could be funded with interest accrued in an endowment. If an easement holder cannot continue holding an easement, holding rights would default to the Service. The Service would assume operations and maintenance or transfer them to a qualified nonprofit agency.

The conditions of an easement may include an interest in the water rights appurtenant to the lands under easement, or easement waters. The associated water rights could include riparian water rights, appropriative water rights, water rights secured under contract between the landowners and an irrigation or water district; and rights to any water from existing or future

wells associated with the easement lands. The Service may acquire that portion of the water right reasonably required to meet habitat management or protection objectives.

Fee title purchase from willing sellers would provide the greatest habitat protection and maximum flexibility for habitat restoration and management, as all land use rights would be acquired. Changes in land use practices would be similar to those for conservation easements but could be



more comprehensive. The landowner would receive payment based on fair market value. The purchased property would be held by a nonprofit organization (land trust) or government agency. The land holder would be responsible for planning and management of the property.

Similar to conservation easements are “set-aside agreements” with willing sellers that would include an annual payment based on a percentage of appraised fair market value of adjacent agricultural land. In general, landowners would not develop within the agreement area for a specified period. As with easements, landowners may retain certain noncommercial land use rights, and agreement provisions would carry over through changes in land ownership.

A “transfer of development rights” with local governments is another potential approach to land conservation. Land development potential in ecologically sensitive areas would be transferred to alternative sites where development is more innocuous. This method has been effective in California for addressing commercial and residential development (CA Resource Agency 1989:42). Local governments could help relieve development pressure in riparian zones by assigning credits to owners of habitat that can be developed, and allowing landowners to trade credits for development rights on alternative sites.

Once conservation lands are identified and any land use restrictions are determined, additional actions described under the Proposed Actions could be implemented per the land conservation agreement. All additional actions would be consistent with purposes of land conservation. Within a corridor of 300 ft from either side of the stream, it is estimated that about 749 acres of lands (includes all land use types) within Tehama County (Table 1) could be eligible for easements, set-aside agreements, transfer of development rights, or fee title purchase.

2. Fish Screens

The presence and operation of fish screens at diversions is an integral part of fish passage, protection, and restoration. Potential fish screening projects include installing new fish screens, expanding or relocating existing screens, and repairing damaged screens. Fish screens would have either squared or rounded openings ≤ 2.38 mm (3/32 inches) wide, or slotted openings ≤ 1.75 mm (0.0689 inches) wide for protection of juvenile and adult salmonids (CDFG 1997, NMFS 1997). Screen panels would be checked before installation and regularly, thereafter, for nicks, burrs, damage, and deformities. Abnormalities would require repair or replacement. Other pertinent CDFG and NMFS requirements, such as approach velocities, sweeping velocities, and open areas, also would be met. Potential screen expansions and construction would be limited to the size most appropriate to meet diversion flows (e.g., 100-150 cfs). Fish screens may be relocated to allow consolidation of diversions, as well as provide better access for maintenance. Potential locations of screens would be at or downstream of diversion entrances. Screens at diversion entrances would be aligned parallel to the stream flow, and in a position that best minimizes eddies in front, upstream, and downstream of the screen. Screens placed downstream of diversion entrances would have an effective bypass system to collect and safely return fish to the stream.



Automatic cleaning systems, such as air bursts, wipers, or paddle wheels would be installed for any new or modified fish screens, as necessary.

Temporary gravel cofferdams may be necessary to dewater construction sites. Cofferdams would consist of washed, noncrushed river-run rock, generally between 0.25 to 4 inches in diameter, and may be spread evenly in the stream after construction is completed. Screened pumps may be required for dewatering prior to and during construction activities. There are four known screened agricultural diversions during times of the year when anadromous fish are in the stream and water is taken. Thus the number of screens needed within the lower watershed is not likely to be more than four.

3. Fish Passage

Migrating salmonids need uninhibited instream passage to spawning habitat. Potential fish passage projects include consolidating diversions, removing unneeded dams and weirs; modifying existing dams, weirs and fish ladders; and installing new fish ladders. Diversion canals may be modified to receive water from consolidated diversion points. Potential canal modifications include moving, extending, connecting, shortening, and widening. Alternatively, new canals may be constructed. Water may be transported across stream channels through suspended pipelines or flumes, or under stream channels through siphons.

New fish ladders may be installed or modified to replace poorly functioning ladders that cannot pass fish easily during certain flow conditions. Modified or new fish ladders may have wider flow ranges for passing fish. Locations for new fish ladders would be where construction, operation, and maintenance access are most efficient, usually at stream edges. Potential designs of fish ladders include pool and weir, vertical slot, and roughened channel types. All fish ladders would meet CDFG and NMFS specifications, and may include fish counting facilities. Poorly functioning fish ladders may be removed, capped, or continue to be used in combination with new adjacent ladders. Dam removal actions may require that replacement diversion facilities and fish screens be proved effective.

Temporary gravel cofferdams may be necessary to dewater construction sites. Cofferdams would consist of washed, noncrushed river-run rock, generally between 0.25 to 4 inches in diameter, and may be spread evenly in the stream after construction is completed. Screened pumps may be required for dewatering prior to and during construction activities. The number of fish passage

obstacles within the watershed is unknown. Therefore, the number of sites that may be involved in this action is unknown.



4. Spawning Gravel Replenishment

Salmon and steelhead trout require beds of clean loose gravel in the streambed for spawning. However, spawning gravel needs for the watershed have not been determined. Suitable locations for gravel replenishment would depend on the history and potential for spawning use, the lack of quality or quantity of spawning gravel, the fluvial geomorphology, the accessibility, and landowner participation. Candidate restoration sites also should have adequate instream and shoreline cover available, and should have flows available to provide suitable water temperatures for incubation. Potential actions include selective gravel placement in streambeds and measures to improve condition of existing gravel (restoration of fluvial processes to enable gravel recruitment are addressed under Channel and Instream Habitat Modification).

Suitable locations for gravel placement might include areas where added gravel would be transported downstream during high flows; such as the mouths of tributaries, on point bars, and near eroding stream banks. Engineering criteria for placement sites would include appropriate slopes, suitable water velocity and depth, and correct mixture of gravel sizes. Added gravel would generally be composed of about 80% 0.5- to 2.0-inch diameter and 20% 2.5- to 4.0-inch diameter river rock (Reynolds et al. 1993). Gravel would be sourced to ensure that migrating salmon are not attracted into the wrong spawning streams due to olfactory responses to gravel from other watersheds. Washed gravel would be transported in steam-cleaned truck beds and placed into streambeds during low flow periods. Old and new gravel may be mixed on-site, if necessary, by first mechanically ripping compacted material and then adding new gravel. Streambed contouring may be necessary and toe bars could be added to anchor gravel, provide proper hydrology and provide cover for fish.

Compacted or cemented gravel in streambeds could be improved by ripping with heavy equipment. Ripping would loosen the gravel and break up armoring from deposits of clays and other fines. This action would also take place during low flow periods, and could require repeated treatments from year to year. Ripping could also be used to mix existing gravel with new gravel at placement sites. Engineering considerations for ripping would be similar to those described for selective gravel placement.

Gravel treatments over multiple years may be necessary for optimal success. Temporary gravel cofferdams may be necessary to dewater work sites. Cofferdams would consist of washed, noncrushed river-run rock, generally between 0.25 to 4 inches in diameter, and may be spread evenly in the stream after construction is completed. Screened pumps may be required for dewatering prior to and during construction activities. After construction, stream banks would be resloped, revegetated with native species, and supplemented with appropriate sized gravel to prevent sloughing, as needed. If needs to replenish spawning gravel are identified, the maximum amount anticipated would be about 5,000 cubic yards.



5. Channel and Instream Habitat Modification

Proposed channel and instream habitat modifications would depend on the existing fluvial geomorphology and the needs of anadromous fish in that area. Passive restoration could be effective when the source of disturbance to the stream channel can be removed or controlled, and the channel protected from further disturbance to allow recovery on its own. Natural fluvial processes would be relied upon to restore the channel to an ecologically healthy condition. An example is the elimination of a siltation source, followed by seasonal high flows to flush sediment from the streambed.

Active restoration actions could include relocation of channel pathways to better conform to flow regimes and modification of channel geometry, such as width, depth, and gradient to establish an equilibrium in fluvial processes. Creation of riffles, runs, and pools of appropriate size, proportion, and interspersions are potential channel design features that can improve fish cover, spawning areas, and invertebrate production sites. Channel features that attract fish into undesirable locations where they may be injured or stranded may need to be removed or modified. Channel modifications to remove habitat structures favored by predators of salmon and steelhead trout may be necessary to improve survival of smolts and young steelhead. Natural barriers to fish migration, such as boulders, log jams, or step waterfalls, could be removed or modified to provide fish passage. Addition or removal of fluvial materials such as cobble and boulders could be required to improve channel substrates (gravel replenishment for spawning is addressed under Spawning Gravel Replenishment).

Other potential actions for improvement of instream habitat involve installation of structures in the stream channel. Riparian vegetation and natural channel morphology, such as undercut banks, provide very high quality cover for fish and other aquatic organisms. However, human-made structures can be effective for treating trouble spots, or supplementing natural forms of cover until fluvial processes can re-create adequate natural cover. Materials for instream structures include boulders, logs, root wads, gabions, wire fencing, and concrete. Some of the many possible structures include boulder clusters, log or boulder weirs, divide logs, digger logs, spider logs, upsurge weirs, culvert baffles, waterbars, check dams, or combinations of these structures.

Modification of channel morphology could require acquisition of fill material from borrow sites, or produce spoil material that would require disposal. Excavating, filling, and grading would occur within the stream channel to establish new configurations and geometry. Some situations could require removal of riparian vegetation to allow access of heavy equipment or accommodate new channel designs. Installation of instream structures could involve trenching in stream banks and streambeds and anchoring with rebar, fence posts, and steel cable. Temporary gravel cofferdams may be necessary to dewater construction sites. Cofferdams would consist of washed, noncrushed river-run rock, generally between 0.25 to 4 inches in diameter, and may be spread evenly in the stream after construction is completed, as appropriate. Screened pumps may be required for dewatering prior to and during construction activities. The amount of channel and



instream habitat modification has not been identified. It is assumed, therefore, that the entire creek channel within the Action Area is eligible for this action.

6. Stream Bank Modification

The specific stream bank improvements implemented on a site would depend on the nature of the problem, channel type, stream hydrology, availability of materials, site access, and other considerations. Potential stream bank improvement activities include recontouring the topography of banks or adjacent slopes and creation of berms. Wing-deflectors made of boulders or logs may be constructed to deflect water away from banks. Stone riprap or bank cribbing made of boulders or logs could be installed to protect banks from erosion, although many bioengineered bank treatments are also available and can be environmentally and economically superior to rock riprap. These include revetment with combinations of trees, logs, root wads, boulders, and other native materials; application of geotextile fabrics; installation of willow walls, fascines, siltation baffles, and brush matting made from live plant material; and others. Metal posts, cables, and other reinforcement materials could be incorporated into many of the bank improvement designs, and toe trenches may be needed to resist undercutting by currents. Other possible bank improvement activities include the removal or replacement of existing bank structures if they are not functioning as desired, or are in poor condition. Any of these activities could be applied singly or in combination, and other environmentally compatible materials could be used in addition to those listed here. Improvement of stream banks may or may not include mulching or planting riparian vegetation.

Temporary gravel cofferdams may be necessary to dewater construction sites. Cofferdams would consist of washed, noncrushed river-run rock, generally between 0.25 to 4 inches in diameter, and may be spread evenly in the stream after construction is completed. Screened pumps may be required for dewatering prior to and during construction activities. The amount of streambank modification that is needed in the watershed is unknown. It is assumed, therefore, that the entire creek channel is eligible for this action.

7. Riparian Revegetation

Specific riparian enhancement actions on a site would depend on land ownership; floodplain elevation, contours, and soils; channel morphology; stream hydrology; site access; and other considerations. Natural maintenance of riparian vegetation requires flooding, erosion, and soil deposition. Therefore, the effectiveness of riparian restoration may depend on other complementary actions to provide these natural processes. Enhancement may or may not involve bank improvement. Riparian vegetation on natural floodplain soils is of highest quality and would be most desirable, but revetted banks also could be planted with riparian vegetation.



Riparian enhancement could be passive, active, or in combination, and could occur on existing degraded riparian habitat areas or on other land types acquired for riparian habitat restoration. Passive enhancement would provide opportunities for vegetative recovery (e.g., protection), and allow vegetation to restore itself through natural processes such as sprouting and seed dispersal. This may be desirable if remnant stocks of desirable plant species exist and expected recovery time is acceptable.

Active restoration may be required on sites that are extremely degraded, or where passive recovery would not be successful or timely. Active restoration generally includes site preparation and planting, removal of exotic competing plant species, weed control, and irrigation. Planting would generally include trees, shrubs, and herbaceous species. Species selection and planting pattern would generally attempt to reproduce species composition and vegetational structure of similar natural sites. However, restoration practicalities such as immediate soil stabilization; flood tolerance; and expected vigor, growth, and survival of plants are additional considerations. Site preparation can involve tillage and discing (contouring is addressed under Streambank Modification). Depending on soil conditions, it may be necessary to add top soil, fertilizer, mulch, or other soil amendments. If planting is done on revetted streambanks, rock can be temporarily removed at sites of individual plants, and replaced after planting.

Potential plant sources are seeds, seedlings, cuttings, liners, tublings, and various size container stock. Weed control and removal of other exotic plant species may involve use of mulch, hand tools, “powered weed eaters”, and herbicides. Plant protectors could be installed to help protect new plants from weeds and browsing animals. Irrigation could be provided by natural flooding, managed flooding, or hand watering, but drip line systems or overhead sprinklers are often used. Drip line and overhead sprinklers may require installation of pumps, filters, and distribution lines. If natural flooding of a site is not adequate and water rights attached to the site are not available, it may be necessary to purchase water from adjacent streams or canals until the vegetation can become independent of irrigation (generally about 3 years).

Within a corridor of 300 ft from either side of the stream, it is estimated that about 201 acres of lands could be eligible for riparian revegetation (Table 1). This includes nonflooded agriculture, orchard/vineyard, flats, and grassland land use types. About 495 acres of existing riparian woody habitats are estimated to be available for riparian vegetation enhancement. Acreage for revegetation and enhancement is not estimated for riparian areas through foothill and mountain forested types as data were not available.

8. Meander Belt and Floodplain Management

Opportunities for meander belt and floodplain restoration would depend on bank protection and flood control needs, land ownership and land uses, floodplain elevation and soils, channel morphology, stream hydrology, and other considerations. Meander belt and floodplain restoration would require removal of meander-inhibiting structures to allow streams to return to natural



patterns of erosion and deposition. These actions could involve modification or relocation of bridge abutments or other fixed structures, riprap removal, removing or setting back levees, and other channel modifications. Setting back levees would require removing existing levees and rebuilding them farther back from the stream channel. The distance of levee set back would depend on conditions outside existing levees and the width of the historic floodplain. The new channel would be designed to accommodate the same or greater flow capacity as the existing channel and would be integrated into the overall channel system.

Once fixed structures are removed, natural process, such as erosion, deposition, and vegetation recovery, could be relied upon to restore the meander belt and floodplain ecosystem. Alternatively, additional restoration actions could be implemented, such as channel and instream habitat modification, streambank improvement, terracing, berm creation, riparian vegetation restoration, and gravel replenishment to supplement natural recovery. Meander belt and floodplain restoration may or may not require altering land uses. If existing land uses are compatible with stream meander and habitat restoration within the new meander zone, few adjustments would be needed. Otherwise, converting land uses to natural flood plain or other compatible uses would be necessary. This could be accomplished with flood easements, whereby land owners would be monetarily compensated for lost uses of land due to flooding. Other approaches are voluntary land owner conversion, conservation easements, or land purchase from willing sellers.

All levees on Deer Creek are in the Action Area within 10 miles of the confluence of the Sacramento River. The DCWC, with the proposed *Deer Creek Flood Plan* (DCWC 1998b), seek to investigate the feasibility of setting back levees, restoring natural channel processes, increasing the width of the riparian corridor and enhancing/restoring native vegetation.

9. Agricultural Management

Land managers may restrict land uses that adversely affect fish and wildlife habitat, or that prevent or impair recovery of habitat through natural succession. Potential agricultural management techniques include elimination or management of discing, burning, mowing, alteration of natural topography, leveling of land, and other agricultural practices. Other options are to eliminate or manage wood cutting or clearing of woody vegetation. Agricultural land may be actively converted to riparian habitat or to land covers that would protect the riparian zone.

Managers may also eliminate or manage pesticide spraying and the application of chemical fertilizers that can degrade water quality or be toxic to wildlife. Storage of pesticides, fuels, and other hazardous materials that can be detrimental to fish and wildlife habitat can be eliminated or managed to prevent storage container leaks or spills.

Management practices for rangeland include reduction of grazing intensity by modifying season of use, pasture rotations, stocking rates, and grazing duration. Distribution of livestock can be



controlled by fencing, creation of stock trails, placement of off-stream water facilities, placement of salt and minerals, placement of supplemental feed, and manipulation of forage quality through fertilization or burning. Fencing livestock away from streambeds or creating livestock exclusion zones of a prescribed width, while providing off-stream water supplies, could protect riparian corridors. Fencing activities could include installation, repair, or replacement. Fencing protocols would be consistent with Bureau of Land Management's (BLM) fencing guidelines (BLM 1989), or similar alternatives, to minimize restriction on wildlife movement. All fences would be installed manually unless heavy equipment becomes necessary.

Within a corridor of 300 ft from either side of the stream, it is estimated that about 749 acres of lands (includes all land use types) within Tehama County (Table 1) could be eligible for agricultural management.

10. Road Management

Measures to control erosion and sedimentation depend primarily on soil type, cause of the problem, and severity of the problem. Areas with potential or current erosion problems may be revegetated as permitted by topography and soils. Where practical, moderate to highly unstable roads, parallel road systems, and temporary or nonsystem roads may be temporarily, seasonally, or permanently decommissioned. Permanently decommissioned roads would be revegetated with vegetation native to the area. Where landslide potential exists, roads may be outsloped. Unstable fill along roads and landings could be pulled back. Stream crossings on in-service roads and trails may be repaired or upgraded, or may be completely removed on decommissioned roads. Worn or undersized culverts could be replaced with culverts sized for a specified capacity, such as 50- to 100-year storms. Rolling dips may be placed on roads at stream crossings that divert excess flows away from stream channels. Rolling dips also may be used to drain road surfaces and inside ditches or, alternatively, inside ditches may be permanently removed to provide long-term control of road surface drainage. Eliminating inside ditches may require that roadbeds be reshaped to slant outward. Other drainage improvements may consist of water bars, cross drain installations, revegetation of fill and cut slopes, sidecast removals, road prism shaping, or other related activities. The amount of road management that is needed in the watershed is unknown. It is assumed, therefore, that all roads are eligible for this action.

11. Monitoring

Monitoring will be performed in the watershed to collect baseline data and to evaluate implemented actions. All site-specific actions will require a monitoring plan. Monitoring is crucial to determine effectiveness of implemented actions relative to preestablished criteria and whether supplemental or remedial measures are necessary. For example, vegetation monitoring would determine the success of planting efforts. Project monitoring would generally include pre- and post-project sampling of proposed areas. Results of monitoring could help managers



determine whether fish and wildlife are making use of restored habitat in anticipated numbers, provide information as to what restoration actions are most beneficial with the limited funding available, and identify needs for supplemental actions to achieve desired results.

Fishery monitoring could include measures of gravel permeability, intragravel dissolved oxygen, intragravel temperatures, instream flows, water quality, water surface elevations, stream gradients, pebble counts, redds counts, and erosion and deposition. Biological surveys may be conducted to determine abundance of aquatic invertebrates, fish migration patterns, fish ladder counts, spawner escapement, and effectiveness of ladders and screens. Depending on the component to be monitored, potential methods could include on-site inspection and sampling, data collection from topographic maps and automated monitoring stations, and mark-and-recapture studies.

Terrestrial monitoring could include survival and growth rates of vegetative plantings; height, density, and cover of vegetation; habitat use by wildlife; grazing by livestock; land use practices; and presence, absence, or abundance of animals. Potential methods include on-site inspections, field surveys, sampling on transects or in plots, and aerial photograph interpretation. A monitoring program is required for actions funded by AFRP. Monitoring information obtained on site must also be provided to the CVPIA under its Comprehensive Assessment and Monitoring Program (CAMP). The CAMP is an ecosystem-level monitoring program established by Section 3406(b)(16) of the CVPIA to assess effectiveness of restoration actions relative to the AFRP's anadromous fish production targets throughout the Central Valley.

ASSOCIATED MITIGATION AND CONSERVATION MEASURES

Mitigation and conservation measures for vegetation and wildlife (VW), fisheries and water quality (FWQ), special status species (SSS), hydrology and stream channel (HSC), air quality and noise (AQN), recreation (R), socioeconomic conditions (SC), cultural resources (CR), hazardous materials (HM), and access, roads and traffic (ART) were designed to mitigate a wide range of potential impacts from the Proposed Actions so that site-specific compliance will be simplified and expedited. Incidental adverse effects of actions and mitigative measures will need to be determined during site-specific environmental compliance. Each action proposed at the site-specific level will additionally need to determine potential effects on special status species and identify appropriate conservation measures. A complete description of the proposed mitigation and conservation measures are described in Appendix A. Each measure has been assigned an identity code that is referenced in the effects and mitigation summary table (Appendix D).



3.0 AFFECTED ENVIRONMENT

The affected environment includes the physical areas and resident species potentially affected by changes that would occur due to implementing an action alternative. This includes wildlife, vegetation, and fisheries in the area, as well as species listed as threatened or endangered under the ESA.

For a comprehensive description of the upper and lower Deer Creek watershed, please refer to the *Deer Creek Watershed Management Plan* (DCWC 1998a). The Action Area of this PEA covers the combined 11.6 miles of the Valley Reach and Mouth Reach.

Vegetation and Wildlife

The Deer Creek watershed has a diverse composition of vegetation and a variety of plant community types, which changes according to topography and elevations. Native plant communities of the watershed include mixed riparian forest, wetlands (i.e., freshwater marsh, vernal pools, seeps, and montane wet meadows), annual grassland, blue oak-foothill pine woodland, chaparral, and coniferous forests at the eastern higher elevations. (Scientific names of species discussed here are listed in Appendix F).

The lower reach of the watershed includes portions of the Sacramento Valley, ending at the confluence of Deer Creek and the Sacramento River. Native plant communities in the Action Area include riparian, valley oak woodland, blue oak woodland, chaparral, annual grassland, and fresh emergent wetland. This region once supported large expanses of grassland, but has been converted primarily to orchards, row crops, annual grassland and residential developments. A query of the CDFG Wildlife Habitat Relationship Data Base provides a list of 217 bird species, 69 mammal, 20 reptilian species and 14 amphibian species that could be found in the Deer Creek Action Area (Mayer and Laudenslayer 1988). These species numbers were generated from the following WHR database habitats: riparian, annual grassland, fresh emergent wetland, blue oak woodland, riverine, cropland and irrigated row fields.

Riparian communities occur along creeks, canals, and rivers. These communities have adapted to cope with wide yearly and seasonal fluctuations in flow volumes, abundant floodplain moisture, and a dynamic erosion-deposition cycle. Riparian habitats typically support a great diversity of wildlife species because they present a unique combination of surface and groundwater, fertile soils, high nutrient availability, and vegetation layering, all of which form a variety of microclimates. The linear nature of riparian corridors is an ecological factor responsible for the high species diversity and abundance in these habitats; the "edge effect" of transitions between two habitat zones such as riparian and annual grassland promote greater wildlife diversity than in either habitat alone (Odum 1978).



Mixed riparian forest is the predominant riparian type along Deer Creek from the confluence with the Sacramento River to the entrance of Deer Creek Canyon. It also occurs along China Slough and Delaney Slough. The extent of mixed riparian forest along the lower reach of Deer Creek is substantial, but has been reduced from historical extent by local agricultural practices, flood control and urban expansion (Holland 1986). In some areas, mixed riparian forest grades into cottonwood riparian forest closer to the creek channel.

Species present in the mixed riparian community include: western sycamore, Fremont cottonwood, yellow willow, and California black walnut, box elder, red willow, and sandbar willow. Understory species include California blackberry, mugwort, blue elderberry, California button-willow, mulefat, California wild grape, and pipe vine. The habitat also has been invaded by exotic species such as giant reed, Himalaya blackberry, Johnson grass, poison hemlock, and edible fig.

Riparian systems are important to many wildlife species mainly due to the diverse vegetative structure, surface water, and abundance of plant growth. Riparian habitat is used by wildlife for food, water, cover, nesting, thermal cover, and dispersal and migration corridors. Some of the highest breeding bird densities in the United States have been reported from riparian zones. In many areas, nearly 50 percent of the avifauna is primarily associated with and/or reach their greatest concentrations in riparian systems (USFWS, 1980). Typical riparian system birds include the red-shouldered hawk, Swainson's hawk, osprey, great horned owl, California quail, mourning dove, and many small passerine birds including warblers, woodpeckers, flycatchers, and wrens. The riparian corridor provides critical nesting areas for migratory birds including Wilson's warbler, and warbling vireo. Backwaters and sloughs associated with riparian woodlands provide nesting and rearing areas for mallards, wood ducks, and cinnamon teal, and to a more limited extent, gadwall, common mergansers, and Canada geese.

Pools and low-flow shallows provide basking habitat for various amphibians, and common reptile species utilize riparian areas for foraging and cover. Typical mammals found in riparian habitats include mule deer (black-tailed subspecies), opossum, ringtail cat, raccoon, river otter, skunks, beaver, western gray squirrel, and many small rodents.

Valley oak woodland At lower elevations and on sites with deep soils, valley oak is the dominant tree. Valley oak ranges in height from 50 to 115 ft, with mature trunks reaching 3.3 ft or more in diameter. The valley oak subtype varies from savannah-like with an open canopy to forest-like with a nearly closed canopy. Other trees commonly associated with the valley oak woodland subtype include western sycamore, interior live oak, northern California black walnut, box elder, and blue oak. Shrubs are generally sparse but include poison oak, California coffeeberry, blue elderberry, and blackberries. Grasses and forbs include ripgut grass, wild oats, rye-grasses, and Italian ryegrass.

Blue Oak Woodland Above the valley floor and on sites with shallower soils, blue oak mixes with valley oak and becomes the dominant tree in the overstory. Generally, the blue oak subtype forms



a woodland with scattered trees, but given favorable conditions, canopy closure may approach 100 %. The canopy is dominated by mature blue oak trees ranging from 16 to 50 ft in height. Other tree species common in the blue oak woodland subtype of this vegetation type include interior live oak near the Sierra Nevada foothills, and foothill pine at higher elevations. Associated shrub species include California coffeeberry, buck brush, poison oak, California buckeye, western redbud, and manzanita species. The herbaceous layer is dominated by annual grasses and forbs, such as filarees, brome grasses, wild oats, and fiddlenecks. Perennial grasses encountered in this subtype include needlegrasses and melic grasses.

Fresh emergent wetlands are characterized by the presence of erect, rooted, herbaceous, water-seeking vegetation. Freshwater marshes develop where fine-textured sandy and silty soils are permanently inundated or saturated. The community is intolerant of quickly flowing water, water depths exceeding 5 ft, rapid or wide fluctuations in water level, and salt water. This community is restricted to ponds, canals, sloughs, river backwaters, and similar habitats.

Freshwater marshes in the Sacramento Valley are dominated by dense growths of tules and cattails, with occasional verbena, smartweed, rose-mallow, and various rush and sedge species. Open water in and near freshwater marshes and along rivers, oxbows, and quiet backwaters lacks emergent marsh vegetation and is dominated by floating and submerged aquatic species. Common dominants include pondweeds, water-milfoil, waterweeds, duckweeds, bladderworts, and waterlily.

Mixed chaparral is found at lower elevations than montane chaparral and usually forms dense nearly impenetrable thickets with shrub cover approaching 80 %. Species composition of mixed chaparral varies considerably from northern to southern California and with climatic conditions, aspect, and parent material. Common mixed chaparral species include scrub oak, ceanothus, and manzanitas. Other associated shrubs include chamise, poison oak, toyon, sugar bush, laurelleaf sumac, California flannel bush, and yerba santa. Mixed chaparral generally occurs below 5,000 ft elevation on mountain ranges throughout California, except the desert mountains.

Annual Grassland Grassland vegetation is characterized by a predominance of annual or perennial grasses in an open grassland. Most of the grassland in California is dominated by naturalized annual grasses with perennial grasses existing in relictual prairies or on sites with conditions unfavorable for annual grasses, such as serpentine. Annual grasses found in grassland vegetation include wild oats, soft chess, ripgut grass, medusa head, wild barley, red brome, and slender fescue. Perennial grasses found in grassland vegetation include purple needlegrass, Idaho fescue, and California oatgrass. Forbs commonly encountered in grassland vegetation include long-beaked filaree, redstem filaree, turkey mullein, clovers, Mariposa lilies, popcornflowers, and California poppy. Vernal pools found in small depressions with an underlying impermeable layer are isolated wetlands within grassland vegetation. The habitat has also been invaded by exotic species such as yellow star thistle.



Fisheries and Water Quality

Deer Creek's fish population can be classified in groupings: anadromous (life cycle involves fresh and ocean phases); resident (life cycle of native species is completed wholly within Deer Creek); and, exotic (introduced/nonnative species).

Spring-run chinook salmon migrate up Deer Creek from mid-February through mid-July and aggregate in the upper reaches through the summer and then spawn in fall (Colleen Harvey Arrison, DFG, pers. comm). The spring-run spawning area is in the canyon reaches, upstream of the Action Area. Fall-run chinook spawn in the Action Area, but spawning occurs in the fall. Late-fall chinook salmon spawn in winter (See Figure 3). Winter-run chinook have been rarely observed on Deer Creek and are considered strays rather than a specific run. All these species are native to Deer Creek. All runs may use non-native streams as rearing areas (DCWC 1998a). Mean natural production of fish on Deer Creek, estimated for the period of 1967-1991, was about 762 for fall-run chinook salmon and 3260 for spring-run chinook salmon (USFWS 1995c).

Resident native species occurring in Deer Creek are rainbow trout, hardhead, California roach, riffle sculpin, speck-led dace, tule perch, Sacramento pikeminnow, and Sacramento sucker (Dettman 1977). The relatively undisturbed habitat in most of Deer Creek supports a high degree of native fish fauna rarely seen today in any of California's diverse aquatic habitats (estuaries, rivers, streams, springs, lakes, reservoirs, ponds, and canals).

Exotic species known to occur in Deer Creek are brown trout, bluegill, carp, white catfish, small mouth bass, largemouth bass, and green sunfish; they are typically found near the confluence. Many of these are salmon smolt predators that live in warmer, slow moving water.

Deer Creek is one of the few remaining California streams that provides spawning and rearing habitat for spring-run, fall-run, and late-fall-run chinook salmon, because of its relatively undisturbed, even pristine habitat, in the upper reaches. Non-natal winter-run chinook salmon rear in the lower reaches. The watershed has exceptional features which have kept Deer Creek one of the more important salmon streams in the Central Valley. Spring-run salmon and steelhead habitat in the upper watershed is considered to be excellent, with numerous holding areas and an abundance of spawning gravel. Unlike many streams in California, Deer Creek's salmon population and habitat has been protected through the years by its remote location from a major metropolitan population, a steep-sided canyon, absence of a major dam and limited access to the stream in general. Thirty-one miles (53%) of the upper stream flows through Lassen National Forest; much of the rest runs through private landholdings.

In the lower watershed on the valley floor, flood protection, cattle grazing, and water diversions have had a negative effect on the stream's fisheries, especially fall-run chinook salmon spawning (DCWC 1998a) (see Hydrology and Stream Channel below). Channelization reduces the opportunity for deposition of the preferred, small-sized spawning gravels in the natural irregularities in the stream. Gravels that might have been deposited and stable are likely to be



washed downstream during high flows, because of the increased shear stress produced in these straightened reaches. Although bed materials sampled near Highway 99 are relatively large, they are still considered within the range of those used by chinook salmon elsewhere (DCWC 1998a).

Streamflow strongly influences anadromous fish production in Deer Creek. Low flows can lead to poor water quality, which can delay spawning, decrease egg survival, and cause high juvenile mortality during the spring emigration period. Three irrigation diversions are present in the two lower reaches: Deer Creek Irrigation District (DCID) Dam, Kimball Diversion Dam, and Stanford-Vina Dam. Kimball Diversion Dam and Stanford-Vina Dam are owned and operated by the Stanford-Vina Ranch Irrigation Company (SVRIC). Fish ladders are present at each dam. Reduced instream flows from the three diversions and other riparian water rights adversely affect stream habitat in this reach, particularly during late spring, summer, and fall. There are no minimum flow requirements on any of these diversions. Appropriate physical habitat, water temperature, and transportation flows for upstream and downstream migrating salmon and steelhead can be adversely affected in this reach (DCWC 1998a).



Figure 3. Deer Creek Anadromous Salmonid Migration Calendar

| Salmonid | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|------------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Adult Migration ¹ : | | | | | | | | | | | | |
| Spring-Run Chinook | | | | | | | | | | | | |
| Fall-Run Chinook | | | | | | | | | | | | |
| Late-Fall-Run Chinook ² | | | | | | | | | | | | |
| Steelhead | | | | | | | | | | | | |
| Juvenile Migration: | | | | | | | | | | | | |
| Spring-Run Chinook ^{3,4} | | | | | | | | | | | | |
| Fall-Run Chinook ⁴ | | | | | | | | | | | | |
| Late-Fall-Run Chinook | | | | | | | | | | | | |
| Steelhead ⁵ | | | | | | | | | | | | |

¹ Adult migration timing data from Mill Creek Counting station, in operation 1953-1963.

² No data available for late-fall in Deer Creek, but this generalized migration table is correct.

³ This includes both fry and yearling outmigration.

⁴ Spring-Run and Fall-Run outmigrants cannot be identified separately during the spring outmigration time period. Therefore, the fry migration periods are considered the same.

⁵ Rainbow/Steelhead trout have been captured in outmigrant traps from October to June. Peak period not documented.

Source: Colleen Harvey Arrison, CDFG, Region 1 and Sacramento River Salmon and Steelhead Assessment, CDFG, Region 1



Special Status Species

The Service identified 21 federally listed or proposed to be listed species and their habitats that may occur in or be affected by the proposed project (Appendix B). Of these species, the spring-run and winter-run chinook salmon, Central Valley steelhead, giant garter snake, California red-legged frog, bald eagle, and valley elderberry longhorn beetle are listed species likely to be found within the Deer Creek Action Area. The remaining species are associated with habitats unlikely to be impacted by the project. Surveys will be completed prior to and during implementation of the site-specific actions. Also identified are the California State special status species that may occur in the Action Area (Appendix C).

Hydrology and Stream Channel

Deer Creek rises from a group of small springs in Childs Meadows on Butt Mountain, about six miles east of the town of Mineral. Similar to Battle Creek, Mill Creek, and the North Fork of the Feather River, all once celebrated salmon streams, Deer Creek drains the western slope of the lower Cascade Range. After its beginning in a mountain meadow, it threads its way through steep-sided gorges, cutting through cliffs for several miles before flowing out onto the central valley plain, where it winds through shallow gullies toward the Sacramento River. Its confluence with the Sacramento (River Mile 230) is downstream of Shasta Dam and the Red Bluff Diversion Dam. It flows about 45 miles to join the Sacramento River near the town of Vina. Overall basin size is approximately 224 square miles. Elevations in the basin range from 7,866 ft at the summit of Butt Mountain to 340 ft at the confluence with the Sacramento River (DCWC 1998a).

Due to California's Mediterranean climate, (cool wet winters and warm dry summers), rainfall for Deer Creek is a seasonal event. Most of the precipitation occurs in the winter and spring months of the year. The mountainous areas of the watershed receive more precipitation than the valley portions. Mean annual precipitation ranges from 70 inches near Wilson Lake (5,272 ft. MSL), to about 20 inches near the Sacramento River (175 ft. MSL).

Flood Control

The lower reaches of Deer Creek have long been a flooding concern to local property owners and government officials. Publicly-maintained flood control improvements along Deer Creek represent some of the oldest such facilities in Tehama County. They are part of an Army Corps of Engineers project constructed in 1949 under the 1944 Flood Control Act (Public Law No.534), that involved channel clearing, excavation, levee construction in two separate locations, and rock bank protection. The original Deer Creek Channel Improvement extends a distance of 7.4 miles from a point 0.7 miles above Delaney Slough to its junction with the Sacramento River. Specific project works originally authorized by Congress included:



- The cleared and excavated channel of Deer Creek extending from upstream of Delaney Slough downstream to the Sacramento River.
- Levees on both banks of Deer Creek built along low-lying areas between Delaney Slough and the Sacramento River.
- Rock bank protection at various places between the Southern Pacific Railroad and the Sacramento River.
- Levee along the left (south) bank of Deer Creek from Delany Slough upstream 0.7 miles to high ground.

Routine maintenance of the levees generally consists of vegetation control on the levees, access road repairs, minor repairs to bank protection features, and drain pipe cleaning (DCWC 1998a).

The *Deer Creek Watershed Management Plan* presents a summary of the damage which has occurred to the Deer Creek channel, banks, and levees as a result of flood flows and the repairs undertaken to restore the integrity of the flood control project, we refer the reader to this document for additional information.

Presently, flood management policy for the Deer Creek watershed is in the form of non-specific county and Federal Emergency Management Agency (FEMA) guidelines. The FEMA maps indicate a classification of Zone A for areas along Deer Creek in the lower watershed from about two miles northeast of the Stanford-Vina Irrigation Diversion Dam to the Sacramento River. The FEMA defines Zone A as areas of 100-year flood; where base flood elevations and flood hazard factors have not been determined (DCWC 1998a).

In the *Deer Creek Watershed Strategy*, the DCWC states that, with the preparation of a *Deer Creek Flood Plan*, it seeks to investigate the feasibility of setting back levees, restoring natural channel processes, increasing the width of the riparian corridor and enhancing /resorting native vegetation. In addition, the *CALFED Bay-Delta Program*, in its February 1999 *Revised Draft Strategic Plan for Ecosystem Restoration*, also suggests the objective of setting back levees that border the 10 miles of the lower creek channel. This action would demonstrate the benefits of alternative flood management and providing floodplain storage of flood flows, while restoring channel meander, channel-floodplain interaction, riparian succession, and gravel recruitment and transport.

Surface Water Rights

The SVRIC was established about 1918 and was granted water rights by the State Water Commission to divert 15 cfs from Deer Creek for agricultural purposes. The DCID was established about 1923. In 1926 the Tehama County Superior Court adjudicated 100% of the water in Deer Creek to be split between SVRIC and DCID at 65% and 35% respectively. In



1926 changes were made to this original agreement which allowed for an additional 180 acres of riparian rights north of Deer Creek to be included in SVRIC's portion of the split. This made their portion of the water in the creek equivalent to 66.7 % of the entire flow in Deer Creek, while DCID received 33.3% of the entire flow (DCWC 1998a).

Air Quality and Noise

The Deer Creek watershed is located in the Sacramento Valley Air Basin, as designated by the California Air Resources Board. Air quality throughout the watershed is affected by a combination of air contaminants, meteorological conditions, and the topographical configuration of the valley. Atmospheric conditions such as wind speed, wind direction, and air temperature gradients interact with the physical features of the landscape to determine the movement and dispersal of air pollutants. Overall air quality in the watershed is relatively good. Air Quality problems in the valley area are primarily related to burning of rice stubble, mostly occurring in spring and fall. Burn days and no burn days are designated for the counties by the Air Pollution Control District in Sacramento, depending on regional weather patterns and pollutant levels, to maintain acceptable conditions. Dust from agricultural operations, such as rice driers and plowing, also contribute to air pollutants. Wild fires in the Sierra Nevada can effect air quality, particularly during dry summers. A primary factor leading to increased air pollution is population growth with its associated smog produced by vehicle operation and industrial processes.

Based on noise studies in the United States and California's Central Valley, planners generally accept that a direct relationship exists between population density and associated noise levels, with less populated areas typically having a lower noise level (CALFED 1999c). Noise planning standards and noise control ordinances within California's Central Valley are fairly uniform, typically ranging within 5 dBA for a similar land use category. Land use categories throughout the watershed range from undeveloped rural to developed urban (DCWC 1998a). Associated noise levels in the watershed can be assumed to approximate those in Table 2. Most of the potential action area is rural and has relatively few noise receptors such as residences, schools, hospitals, and businesses. Potentially noisier land uses, such as industrial and commercial, and areas adjacent to transportation corridors and airports are possible.



Table 2. Noise levels correlated with land use categories ranging from undeveloped rural to urban (CALFED 1999c).

| Location | Persons/km² | L_{dn} (dBA)* |
|---------------------|-------------------------------|------------------------------|
| Rural | | |
| Undeveloped | 8 | 35 |
| Partially developed | 23 | 40 |
| Suburban | | |
| Quiet | 77 | 45 |
| Normal | 230 | 50 |
| Urban | | |
| Normal | 770 | 55 |
| Noisy | 2,300 | 60 |
| Very noisy | 7,700 | 65 |

*Average sound level for a 24-hr period expressed in decibel units on a human perception scale

Cultural Resources

An archaeological records search was completed for the Action Area by the California State Historic Preservation Office's Northwest and Northeast Information Centers. The Deer Creek watershed is located within the original territory of the Yahai and their predecessors. The area is rich in archaeological and ethnographic sites and historical landmarks. Results of these record searches are on file in the Service's Regional Office in Sherwood, Oregon.

Socioeconomic Conditions And Land Use

Tehama County's economy is driven mainly by agriculture and agricultural related industries. Leading agricultural commodities include prunes, walnuts, figs, almonds, milk, olives, alfalfa, cattle, sheep, fish and nursery products.

The majority of land adjacent to the proposed project stretch is rural and privately owned, and the primary land uses in the proposed stretch are grazing/open space, agricultural and residential. Many tracts are under active grazing and cultivation with orchards and vineyards.

Recreation

The majority of recreation on Deer Creek occurs on public lands in the upper watershed including camping, hiking, backpacking, fishing, white-water rafting, and hunting. Deer Creek supports a important sport fishery, primarily planted hatchery trout. No take of salmon or trout is allowed in the Action Area. A warmwater fishery, primarily for largemouth black bass, also exists in the



sloughs and backwaters of the creek, but adjacent river property is privately owned, making river access difficult. Conditions are conducive to canoeing and other non-motorized boating that does not require water depths greater than a couple of ft.



4.0 ENVIRONMENTAL CONSEQUENCES

Vegetation and Wildlife

NO ACTION ALTERNATIVE

Without the Proposed Actions, vegetation and wildlife conditions in the action area would continue to decline as human populations increase. The level of habitat decline is dependent on many local land planning actions and landowner decisions. Remnant riparian areas and special habitats would continue to decline where they are under cultivation, development, or grazed. Continued encroachment into remnant riparian zones is anticipated without implementation of protection and enhancement actions. Habitat improvement actions also would be dependent on local land management decisions. However, private actions by local stakeholders to enhance and maintain riparian areas also have occurred, primarily through easements. This would be expected to continue in the future, but take considerably longer than with the Proposed Actions.

PROPOSED ACTIONS

All proposed actions are designed to benefit the stream and riparian ecosystem, including vegetation and wildlife. Many of the proposed actions have potential for short-term, incidental adverse effects on vegetation and wildlife. Stream bank modification, riparian revegetation, fish screen and ladder installation, fish barrier removal, and road management, would involve construction or earth disturbing activities. Implementing these actions could temporarily damage vegetation and soil substrates at construction sites, staging areas, and points of access. Work on or near stream banks could result in temporary disturbance of stream bank structure and vegetation loss. Some native vegetation could be inadvertently damaged during removal of exotic vegetation. Noise and human activity at work sites could temporarily disturb wildlife. In some cases, wildlife could be subject to injury or mortality. If fuel, pesticides, or hazardous materials are stored at construction sites, detrimental leaks or spills are possible. With implementation of the mitigative measures (Appendix A, Code VW) to minimize and compensate for adverse effects, unavoidable adverse effects should be minor and short term. Moreover, these adverse effects would be far outweighed by expected benefits to vegetation and wildlife.

Land conservation through easements, fee title acquisitions, set-aside agreements, and transfer of development rights would benefit vegetation and wildlife by maintaining existing biological values and protecting habitats from development and detrimental land practices. Modification or elimination of land use practices that have adverse effects on upland and riparian habitats could protect and enhance ecological values by eliminating causes of habitat degradation, preventing future adverse effects, and enabling recovery of natural ecological processes. Land conservation could reduce further fragmentation of riparian vegetation and discourage urban encroachment

into ecologically sensitive areas. Establishment of conservation lands also would provide opportunities for other proposed actions that would enhance and restore habitat values.



Revegetation with riparian species would increase riparian habitat area and improve riparian habitat values. Enhanced riparian vegetation would provide temperature-reducing shade, nutrient cycling, production of invertebrates, bank cohesion, woody debris used for ground cover, and a buffer zone to impacts from adjacent uplands, such as human disturbance and polluting urban runoff. The near-shore zone is especially important for wildlife that frequent the stream. Improved and reconnected riparian corridors would provide dispersal and migration pathways for wildlife species that cannot traverse drier or more open adjacent areas. Enhanced riparian vegetation also may improve visual aesthetics and shade, and reduce water velocities, bank shear stress, and soil erosion.

Meander belt and floodplain management could convert upland habitats to riparian habitats, but it would be a net benefit, because riparian habitats are relatively scarce and provide high wildlife values. Reestablishing meander belts and widening floodplains would produce a wider corridor and greater diversity of terrestrial habitats, encourage natural regeneration of riparian vegetation and woody downfall, and help create oxbows, sloughs, and side channels. A wider floodplain also should provide greater flood management capacity and flexibility without damaging habitat. Removing structures or discouraging new structures from being built in the floodplain should provide better wildlife habitat and reduce future habitat losses.

Effects of agricultural management on adjacent wildlife habitats may be beneficial or adverse depending on its type, intensity, and duration. Modifying or eliminating land use practices that have adverse effects on aquatic and riparian habitats could protect existing ecological values, eliminate risks to habitats or continuing causes of habitat degradation, and enable recovery of natural processes. All practices proposed under agricultural management would be designed to benefit wildlife by protecting and enhancing their habitats. Proposed grazing practices would benefit riparian wildlife by reducing the crushing and trampling of vegetation, overgrazing, compaction of soils, erosion of stream banks, widening and aggrading of channels, and introduction of sediment and animal wastes into streams. Potential disturbance of vegetation and soils from fence installation and provision of alternative water sources for livestock would be minor and temporary, and should be outweighed by expected benefits from fencing livestock out of riparian habitat areas.

Monitoring is designed to evaluate biological conditions and not alter them. Most adverse effects would stem from disturbance of habitat or wildlife by human activities. However, mitigation measures for monitoring vegetation and wildlife (Appendix A, Code VW) would be applied, and any remaining adverse effects from monitoring should be minor and temporary. Potential environmental effects and mitigation measures for vegetation and wildlife are summarized in Appendix D at the end of the Environmental Consequences section.



Fisheries and Water Quality

NO ACTION ALTERNATIVE

Without the proposed actions, human activities such as impoundments, streamflow diversions, organic pollution from livestock and sewage, and siltation may result in deterioration of aquatic and riparian environments, creating conditions adverse to anadromous fish populations. Despite well-meaning measures of the local conservation organizations, Deer Creek's anadromous populations may still decline. Without the proposed actions, impacts to water quality are likely to be minimal, but may gradually worsen as human population, construction, and industry in the Deer Creek watershed increases.

PROPOSED ACTIONS

All proposed actions are designed to benefit the stream and riparian ecosystem, including fisheries and water quality. Mitigation measures incorporated into the actions (Appendix A, Code FWQ) would largely avoid incidental adverse effects. Nevertheless, many of the proposed actions have potential for short-term, incidental adverse effects on fisheries and water quality. Temporary adverse effects may result from actions involving instream work, including stream bank modification, fish screen and ladder installation, fish barrier removal, and spawning gravel replenishment, or actions near the stream channel, such as riparian revegetation. Instream construction activities, including cofferdam construction, stream bed alteration, heavy equipment movements in the stream bed, and dewatering and rewatering of work sites would disturb soils and sediment and temporarily degrade water quality through turbidity and sedimentation. Fish in all life stages would be subject to these effects, which could include siltation of salmonid spawning habitat downstream. Instream habitat structure, such as pools, riffles, and spawning gravel also may be disturbed or altered in construction areas. Risks also exist for oil and grease discharges into the creek from heavy equipment within the streambed. With implementation of the mitigative measures (Appendix A, Code FWQ) to minimize and compensate for adverse effects, unavoidable adverse effects should be minor and short term. Moreover, these adverse effects should be outweighed by expected benefits to aquatic habitat.

No adverse effects would result from land conservation. Easements, fee title acquisition, set-aside agreements, and transfer of development rights would benefit fisheries and water quality by maintaining existing biological values and protecting habitats from development and detrimental land practices. Modifying or eliminating land use practices that have adverse effects on stream corridors would protect and enhance aquatic habitat by eliminating causes of aquatic habitat degradation, preventing future adverse effects, and enabling recovery of natural ecological processes. Land conservation could reduce further fragmentation of riparian vegetation important to fish at stream edges and discourage urban encroachment into these ecologically sensitive areas. Establishment of conservation lands also would provide opportunities for other



proposed actions, such as riparian revegetation, that may enhance and restore aquatic habitat values.

Removing or modifying water control structures and installing fish ladders would enable greater numbers of adult salmonids to avoid entrainment and stranding hazards and more easily reach spawning habitats. Salmonids also would be less susceptible to injuries during migration and mortality from warm water temperatures and poaching at stranding sites. New or upgraded fish screens would reduce straying and entrainment of juvenile salmonids and other fish species into water diversions during downstream migration. Spawning gravel replenishment would increase the availability and quality of spawning habitat and should improve egg hatching success. High quality spawning gravel also should improve production of aquatic invertebrates.

Modifications of stream banks would improve substrates for growth of riparian vegetation, prevent excessive erosion to improve water quality, and further stabilize streambanks. Modified streambanks also could enhance near-shore cover for anadromous fish and other aquatic species. Channel and instream habitat modification may further benefit fisheries by establishing riffles, pools and runs, and restoring the fluvial processes that maintain them. Modifications of stream channel morphology could reduce erosion and sedimentation and establish flow velocities and depths beneficial to fisheries. Instream cover created by cut banks and additions of boulders, logs, root wads and other materials would enhance cover for fish and other aquatic species.

Riparian revegetation should benefit fisheries and water quality with reduced sedimentation of streams, and increased shaded riverine aquatic (SRA) habitat that would provide temperature-reducing shade, nutrient cycling, input of invertebrates used for food, woody debris used for instream cover. Improved near-shore SRA habitat is especially important for young anadromous fish. Enhanced streamside vegetation would also buffer impacts from adjacent uplands, such as human disturbance and polluting urban runoff.

Reestablishing meander belts and widening floodplains would produce a wider stream corridor and greater quality and diversity of aquatic habitats to benefit fisheries and other aquatic species. A wider floodplain would encourage natural regeneration of riparian vegetation, produce more woody material for instream cover, create sources of spawning gravel, and enhance stream channel complexity, such as riffles, pools, oxbows, sloughs, and side channels. Over time, erosion and deposition on inside bends and point-bars, respectively, would result in channel migration with stream meanders gradually moving downstream. These natural processes would promote and help maintain stream channel complexity for the benefit of fisheries and the aquatic ecosystem.

Effects of agricultural management on adjacent aquatic habitats can be beneficial or adverse depending on its type, intensity, and duration. Modifying or eliminating land use practices that have adverse effects on aquatic and riparian habitats could protect existing ecological values, remove known risks, prevent future risks, eliminate continuing causes of habitat degradation, and enable recovery of natural processes. All practices proposed under agricultural management



would be designed to benefit fisheries and water quality by protecting and enhancing the aquatic ecosystem through reductions in pesticide, herbicide, and chemical use, and restrictions on discing, burning, mowing, and other manipulations where they have adverse effects. Proposed grazing practices would benefit fisheries and water quality by reducing damage to riparian zones, erosion of stream banks, widening and aggrading of channels, and introduction of sediment and animal wastes into streams. Potential adverse effects from fencing, such as stream sedimentation, would be minor and temporary, and should be outweighed by expected benefits from fencing livestock out of sensitive habitat areas.

Monitoring is designed to evaluate biological conditions and not alter them. Most adverse effects would stem from disturbance by human activities. However, mitigation measures for monitoring fisheries and water quality (Appendix A, Code FWQ) would be applied, and any remaining adverse effects due to monitoring should be minor and temporary. Potential environmental effects and mitigation and conservation measures for fisheries and water quality are summarized in Appendix D at the end of the Environmental Consequences section. Adverse effects from monitoring would be negligible associated with the aquatic/riparian ecosystem.

Special Status Species

NO ACTION ALTERNATIVE

Attempts by Federal and State programs to increase the natural production of anadromous salmonids in the Deer Creek watershed and Central Valley would be hindered by the No-Action Alternative. The existing conditions of spawning gravel, riparian habitat, and fish passage would continue to degrade and adversely effect populations of spring- and fall-run chinook salmon and Central Valley steelhead trout. In addition, this alternative would not provide any short- or long-term benefits to other special status species.

PROPOSED ACTIONS

Special Status Species

Measures have been incorporated in the proposed actions to avoid and minimize adverse effects on each species (Appendix A). Potential effects on status species are described below and summarized in Appendix D. Conditions under which site-specific actions would likely have no adverse effect on the species, and under which consultation with the Service would be required are identified. Each action proposed at the site-specific level will review potential effects on federally listed species. When an action proponent proposes that an action is not likely to

adversely affect listed species, the action proponent will request concurrence from the Service and NMFS.



Aleutian Canada goose. Impacts to Aleutian Canada geese will be avoided by restricting construction activities that could disturb birds during their normal wintering and migration period (October 1 to May 14). Some actions may benefit this species by implementing land use practices that would protect resting and foraging habitat. Therefore, Aleutian Canada geese are not likely to be adversely affected by the proposed actions.

Bald eagle. Resting sites for migrating bald eagles will not be impacted because mature trees will not be removed or altered. Construction near nesting sites will be avoided from January 15 to July 31 and provide 0.5 mile buffer protection. The new trees and increased prey base that are expected on enhanced and protected habitats should benefit bald eagles and other birds of prey, especially during the migration periods. Therefore, bald eagles are not likely to be adversely affected by the proposed actions.

American peregrine falcon. On August 25, 1999, the Service determined that the peregrine falcon is no longer listed as endangered, pursuant to the ESA. However, the continued recovery of the peregrine falcon is partially dependent upon Federal agencies continuing to carry out actions that benefit the species. In addition, the peregrine falcon population must be monitored for a five-year period, from the date of delisting, to ensure that it does not decline appreciably, necessitating our need to relist the species under the ESA. Proposed actions will treat the peregrine falcon as a listed species with respect to applying conservation measures during implementation of actions. Resting sites for migrating American peregrine falcons will not be impacted because mature trees will not be removed or altered. Construction near nesting sites will be avoided from January 15 to July 31 and provide 0.5 mile buffer protection. The new trees and enhanced prey base that are expected on enhanced and protected habitat should benefit peregrine falcons and other birds of prey, especially during the migration periods. Therefore, peregrine falcons are not likely to be adversely affected by the proposed actions.

California red-legged frog. Suitable habitats, such as emergent aquatic vegetation, will be avoided to the extent possible, as described by avoidance measures incorporated into proposed actions. Avoidance of these habitats should protect red-legged frogs from movements and operation of construction equipment, construction activities, and loss of habitat. If suitable habitat of red-legged frogs cannot be avoided at a specific site, the Service will be consulted. Because avoidance measures will be applied to each project site, no cumulative effects on red-legged frogs should occur. Increases in stream and riparian habitat quality, such as overhanging willows and emergent aquatic vegetation, are expected to benefit red-legged frogs and other special-status species using these habitats, such as the tiger salamander, northwestern pond turtle, foothill yellow-legged frog, and spadefoot toad. Proposed actions that implement all avoidance measures are not likely to adversely affect red-legged frogs.

Valley elderberry longhorn beetle (VELB). Impacts to elderberry plants will be avoided to the extent possible, as described by avoidance measures incorporated into proposed actions. Avoidance of these habitats should protect elderberry plants from movements and operation of construction equipment, construction activities, and loss of habitat. If elderberry plants may be



impacted at a specific site, the Service will be consulted. Because avoidance measures will be applied to each project site, no cumulative effects on VELB should occur. Enhancements to the riparian zone and increased riparian habitat protection are expected to benefit VELB and other special-status species using these habitats, such as the tiger salamander, northwestern pond turtle, foothill yellow-legged frog, and spadefoot toad. Proposed actions that implement all avoidance measures are not likely to adversely affect VELB.

Vernal pool shrimp. Impacts to Conservancy fairy shrimp, vernal pool fairy shrimp, and vernal pool tadpole shrimp will be avoided to the extent possible, as described by avoidance measures incorporated into proposed actions. Avoidance of vernal pools should protect the shrimp from movements and operation of construction equipment, construction activities, and loss of habitat. If vernal pools may be impacted at a specific site, the Service will be consulted. Because avoidance measures will be applied to each project site, no cumulative effects on vernal pool shrimp should occur. Some actions may benefit vernal pool shrimp by implementing land use practices that would protect vernal pool habitat. Proposed actions that implement all avoidance measures are not likely to adversely affect vernal pool shrimp.

Vernal pool plants. Impacts to Green's tuctoria, Hoover's spurge, hairy orcutt grass, and slender orcutt grass will be avoided to the extent possible, as described by avoidance measures incorporated into proposed actions. Avoidance of vernal pool plants should protect the plants from movements and operation of construction equipment, construction activities, and loss of habitat. If vernal pool plants may be impacted at a specific site, the Service will be consulted. Because avoidance measures will be applied to each project site, no cumulative effects on vernal pool plants should occur. Some actions may benefit vernal pool plants by implementing land use practices that would protect vernal pool habitat. Proposed actions that implement all avoidance measures are not likely to adversely affect vernal pool plants.

Giant garter snake. Suitable habitats of giant garter snakes will be avoided to the extent possible, as described by avoidance measures incorporated into proposed actions. Avoidance of these habitats, such as limiting earthwork activities between May 1 and October 1, should protect giant garter snakes from movements and operation of construction equipment, construction activities, and loss of habitat. If giant garter snake habitat cannot be avoided at a specific site, the Service will be consulted. Because avoidance measures will be applied to each project site, no cumulative effects on giant garter snakes should occur. Enhancements to the riparian zone and increased riparian habitat protection are expected to benefit VELB and other special-status species using these habitats, such as the tiger salamander, northwestern pond turtle, foothill yellow-legged frog, and spadefoot toad. Proposed actions that implement all avoidance measures are not likely to adversely affect giant garter snakes.

Chinook salmon (all runs) and Central Valley steelhead trout. Impacts to spring- and fall-run chinook salmon and Central Valley steelhead will be largely avoided by limiting construction affecting the stream channel to periods when anadromous salmonids are at their lowest abundance (July 15 to September 15), and by other conservation measures incorporated into proposed actions. No adverse impacts are expected for all life stages, including incubating eggs and



juveniles and in-migrating and out-migrating salmonids, because the construction window is within their peak absence. Specifically, instream construction activities between July 15 and September 15 would not adversely affect the following anadromous salmonids because:

- *Spring-run chinook salmon:* 1) adults have already migrated to upstream habitats, and are not present in the lower reach; 2) most of potential work area is downstream of adult holding and spawning habitats; 3) eggs, fry, and juveniles have not been produced; and 4) juveniles from the previous year have not migrated out of Deer Creek, but are rearing upstream of action areas.
- *Fall-run chinook salmon:* 1) adults have not migrated to the area, and are not present; 2) spawning has not occurred, so new eggs, fry, and juveniles have not been produced; 3) juveniles from the previous year have migrated out of Deer Creek.
- *Late-fall-run chinook salmon:* same as for fall-run chinook salmon.
- *Central Valley steelhead:* juveniles from the previous year are rearing upstream of action areas.

Proposed actions that implement all avoidance measures are not likely to adversely affect special status salmonids. However, some construction activities could cause incidental adverse effects, but these should be temporary and minimal. If adverse effects cannot be avoided or minimized, NMFS will be consulted. Instream habitat, such as pools, riffles, and spawning gravel could be disturbed or altered in the construction area. Other construction activities, such as cofferdam construction and associated stream bed alteration, would result in soil disturbance leading to temporary water quality degradation and increased turbidity at and downstream of the construction sites. The soil disturbance would primarily affect the spawning habitat of fall-run chinook salmon since most of the instream activities are limited to lower Deer Creek. The spawning habitats of spring-run chinook and steelhead would not be affected since their spawning range starts several miles upstream of the construction activities. Winter-run and late fall-run chinook salmon should not be adversely affected because they are rarely present in Deer Creek. When late-fall and winter-run salmon are present, the construction window and other conservation measures would provide the same level of protection as with other salmonids. Additional adverse effects on fisheries that may apply to special status salmonids are described under Fisheries and Water Quality. The potential benefits to chinook salmon and steelhead trout species should outweigh any short-term adverse effects. Long-term benefits include, but are not limited to, enhanced fish passage, spawning and rearing habitats, and juvenile survival within Deer Creek. A discussion of additional fisheries benefits that may apply to special status salmonids is provided under Fisheries and Water Quality.

Delta smelt. Delta smelt do not occur in the watershed and will not be directly affected by the proposed actions. Potential indirect effects, such as changes in flows to the Delta, also will not occur because proposed actions will not noticeably alter hydrology of the Sacramento River. Therefore, Delta smelt are not likely to be adversely affected by the proposed actions.



Sacramento splittail. Impacts to Sacramento splittail will be avoided to the extent possible, as described by avoidance measures incorporated into proposed actions including avoidance of shallow water with submerged vegetation during the March through May spawning period. Changes in timing and quantity of watershed flows into the Sacramento River will be insignificant. Because avoidance measures will be applied to each project site, no cumulative effects on the Sacramento splittail should occur. Other potential adverse effects on splittail and associated conservation measures are described under Fisheries and Water Quality. Enhancements to the riparian zone and increased riparian habitat protection are expected to benefit splittail and other special-status species using these habitats. Proposed actions that implement all avoidance measures are not likely to adversely affect vernal pool plants.

Western yellow-billed cuckoo. Impacts to riparian forest habitat will be avoided to the extent possible, as described by avoidance measures incorporated into proposed actions. Avoidance of these habitats should protect yellow-billed cuckoos from construction activities and loss of habitat. If habitat suitable for yellow-billed cuckoos cannot be avoided at a specific site, CDFG will be consulted. Because avoidance measures will be applied to each project site, no cumulative effects on yellow-billed cuckoos should occur. Enhancements to the riparian zone and increased riparian habitat protection may benefit yellow-billed cuckoos and other special-status species using riparian habitats.

Bank swallow. Impacts to soil banks suitable for bank swallow nesting will be avoided to the extent possible, as described by avoidance measures incorporated into proposed actions. Avoidance of these habitats should protect bank swallows from construction activities and loss of habitat. If habitat suitable for bank swallows cannot be avoided at a specific site, CDFG will be consulted. Because avoidance measures will be applied to each project site, no cumulative effects on bank swallows should occur. Enhancements to the riparian zone and increased riparian habitat protection may benefit bank swallows and other special-status species using soil banks, such as belted kingfishers and barn owls.

Swainson's hawk. Nesting and resting sites for Swainson's hawks will not be impacted because mature trees will not be removed or altered. Construction near nesting sites will be avoided from March 1 to July 31 and provide 0.5 mile buffer protection. New riparian habitat created by implemented actions may enhance the prey base to the benefit Swainson's hawks and other birds of prey.

Hydrology and Stream Channel

NO ACTION ALTERNATIVE

Without the proposed actions, the hydrology of the area may continue relatively unchanged or continue to degrade. Additional diversions of water from the system may be necessary to supply water to a growing human population in the watershed. The stream channel would likely continue



to be degraded by additions of riprap, maintenance of levees, and use disturbance by livestock and other agricultural practices.

PROPOSED ACTIONS

Many of the proposed actions, such as fish passage, fish screens, spawning gravel replenishment, channel and instream habitat modification, meander belt and floodplain management, and streambank modification, would directly alter the stream channel and affect stream hydrology. However, all such modifications would be designed to enhance hydrological and fluvial processes. Mitigative measures incorporated into proposed actions for hydrology and stream channel (Appendix A, Code HSC) would help ensure that any adverse effects are avoided or minimized. Minimal and temporary effects on hydrology would occur during instream construction for installation or repair of fish screens and ladders, and for removal or modification of fish barriers. Actions would be designed and implemented to preserve or enhance groundwater hydrology and flood capacity, but instream flow would be temporarily redirected if cofferdams are needed. Placement of spawning gravel could increase the wetted area of streams due to displacement of water, but should not adversely affect hydrology or streambanks. Instream flows, water elevations, and fluvial processes could be permanently altered by adding, modifying, or removing water control structures, reconfiguring the channel, adding materials for fish cover, or modifying streambanks. However, by design, effects on fluvial functions should be beneficial. Operations at new or modified water control structures would be designed, with consideration to system interdependencies, to maintain beneficial uses of water.

Removing or setting back levees could alter hydrology and fluvial processes by widening constricted channels, but should create a more natural and stable state. The widened floodplain would be designed to benefit the stream channel by decreasing the speed of flood waters and increasing flood flow and storage capacity. Another benefit would be an increased wetted area and time period in which to recharge groundwater. Revegetation associated with stream channels would not be allowed to interfere with passage or storage of flood waters. Agricultural management, road management, and monitoring are not expected to produce adverse effects. Potential adverse effects and corresponding mitigation measures for hydrology and stream channel are summarized in Appendix D.

Air Quality and Noise

NO ACTION ALTERNATIVE

Without the proposed actions, the air quality for the area would not be affected except for actions which take place under existing permits. Air quality may gradually worsen as population, construction, and industry in the Deer Creek watershed increase. Noise would not be expected to significantly change.



PROPOSED ACTIONS

The proposed actions may cause short-term impacts on air quality. Impacts on air quality would include dust/particulate generation from hauling supplies (fill, topsoil, and gravel), earthwork activities, and combustion emissions (nitrogen oxide, carbon monoxide, and ozone) resulting from operating construction equipment and hauling trucks. However, mitigative measures for air quality have been incorporated into proposed actions (Appendix A, Code AQN). With these measures, air emissions are anticipated to fall within the levels existing in the project zone. Most proposed actions would occur within rural areas with few noise receptors. Noise levels would be expected to increase from construction activities and construction equipment operation, such as trucks on haul roads and earth-moving equipment and electrical generators at construction sites. Given mitigation measures for noise incorporated into proposed actions (Appendix A, Code AQN), adverse effects from noise are not anticipated. Potential environmental effects and corresponding mitigation measures for air quality and noise are summarized in Appendix D.

Cultural Resources

NO ACTION ALTERNATIVE

With the No Action Alternative no cultural resources would be impacted.

PROPOSED ACTIONS

The diversity and scope of the proposed actions have the potential to disturb both exposed and buried cultural resources. Mitigative measures incorporated into proposed actions for cultural resources (Appendix A, Code CR), including compliance with the Programmatic Agreement between the Service, the Advisory Council on Historic Preservation, and the California State Historic Preservation Officer (SHPO), will be exercised at site-specific project levels to avoid adverse effects. Activities that have negligible potential to affect historic properties include planting, pruning, vegetative removals without surface disturbances, herbicide application, mowing, disking within plow zones, and fencing. After review of proposals by a Service Historic Preservation Specialist (Specialist), these actions may not require further compliance to protect cultural resources.

Projects that have potential to affect historic properties, such as recontouring, excavations, and culvert modifications, would require on-site surveys by a Specialist. These projects would be deemed to have no adverse effects and could proceed without further need for formal cultural resource consultation, if the Specialist does not find any major cultural resources. If the Specialist determined that a project was outside the scope of the Agreement, a proposed action would follow the standard process for Section 106 of the National Historic Preservation Act, with review by SHPO, before proceeding to ensure that cultural resources are protected. Appropriate consultations would be conducted for any significant cultural resource sites to ensure proper mitigation, as needed. If human bones are found, the Tehama County Coroner, the Native



American Heritage Commission, and the Service's Regional Archaeologist will be contacted. Because projects would go forward only upon compliance with these protocols, adverse effects to cultural resources are not expected for any proposed action. Potential environmental effects and corresponding mitigation measures for cultural resources are summarized in Appendix D.

Socioeconomic Conditions and Land Use

NO ACTION ALTERNATIVE

Land use in the watershed would probably see some shift from agricultural uses to more intensive urban uses as a result of human population increases. The socioeconomic base would consequently shift a small degree from agriculture toward the municipal and industrial side. Land uses may face greater development restrictions in some areas due to conflicts with fish and wildlife habitats, including threatened and endangered species.

PROPOSED ACTIONS

Land conservation, meander belt and floodplain management, riparian revegetation, and agricultural management actions could adversely affect agricultural production and tax revenue in Tehama County. Land types and acreage eligible for land conservation, meander belt and floodplain management, riparian revegetation, and agricultural management actions in Tehama County is estimated in Table 3. Eligible acreage of different land types is relatively small, generally 0.1-0.2 percent of the total area of the land types within the county. These estimates only represent land eligibility as described under the Action Descriptions section of this document, and do not imply that all of the acreage would be proposed for site-specific actions. Proposed amounts would likely be even less.



Table 3. Total estimated acres of land use types¹ within a 600-ft-wide corridor (300 ft from each bank) along Deer Creek from the Deer Creek Irrigation Dam to its confluence with the Sacramento River, compared to total estimated acres within Tehama County.

| Land Use Type² | Corridor Total | Tehama County Total | Percent of County Total |
|----------------------------------|-----------------------|----------------------------|--------------------------------|
| Nonflooded Agriculture | 49 | 158,084 | 0.03 |
| Orchard/Vineyard | 103 | 38,325 | 0.27 |
| Grassland | 41 | 238,789 | 0.02 |
| Flats | 8 | 1,470 | 0.54 |
| Riparian Woody | 495 | 15,200 | 3.3 |
| Blue Oak Woodland | 25 | 336,404 | 0.01 |
| Mixed Chaparral | 23 | 72,557 | 0.03 |
| Other | 5 | 3,721 | 0.13 |

¹Source: CDFG et al. 1997; California Gap Analysis 1998. Acreage for land use types was calculated from satellite imagery and should be considered approximate. Because classification of land use types from satellite imagery is approximate, some minor land use types may be missing, and acreage for others may be somewhat over or under represented.

²Nonflooded agriculture is primarily row crops and other nonflooded types; Orchard/Vineyard is primarily almonds, walnuts, and other types; Grassland is managed and natural grasslands; Riparian Woody is primarily riparian forest and scrub; Blue Oak Woodland and Blue Oak/Foothill Pine is primarily used for grazing and open space; Flats are primarily mud flats and sand bars; Other is primarily human developed areas and paved surfaces.

In affected areas, agricultural productivity and income to the local economy could be reduced by restricting agricultural practices or replacing agricultural land with riparian or upland habitat types. Values of associated lands could decline due to lessened agricultural potential, which would reduce county property tax revenue. Restrictions on land development could preclude future increased tax valuations of the land. However, County tax revenue on fee title lands acquired by the Service could be reduced if the annual payments to counties under the Refuge Revenue Sharing Act were insufficient and Congress does not appropriate supplemental payments. The authorized revenue sharing rate paid to local jurisdictions during Federal fiscal years 1972 to 1997 averaged 80.6%.

Reduced tax revenue may be partially offset for lands acquired by the Service if the lands are enrolled in Williamson Act contracts, as tax rates under these contracts are based on agricultural use rather than market value, and would no longer apply. Costs to counties and landowners for



flood control maintenance and damage from floods could be reduced by restoring meander belts and widening the floodplain to more easily accommodate flood waters.

Landowners would not be adversely affected, as land conservation and floodplain management would be implemented on a willing seller basis, and landowners would be paid fair market value for land, restricted land uses, or agricultural productivity due to flooding. Because property taxes and assessments on lands under conservation and flood easements would continue to be paid by landowners, reduced land values could benefit land owners by reducing the taxes and assessments. Other possible tax benefits to landowners include reduced income and capital gains taxes. Easements also can reduce estate taxes when land is passed on to heirs, as restrictions on property development would continue to reduce the property's market value. Gift easements may qualify for tax deductions if the easements meet Federal tax code requirements.

The proposed actions would benefit salmonid survival and recovery and the increased salmon and steelhead production should have economic and community benefits in terms of recreation and aesthetics. Benefits to the riparian ecosystem are further described under the effects of other actions that may be implemented in conjunction with the Land Conservation action. Construction activities for proposed actions would have a beneficial effect on the local economy, as local contractors would be hired to the extent practicable. Removing structures or discouraging new structures from being built in the floodplain should reduce flood damage and associated costs. Potential environmental effects and corresponding mitigation measures for socioeconomic conditions are summarized in Appendix D.

Recreation

NO ACTION ALTERNATIVE

Without the proposed actions the recreational opportunities would not change.

PROPOSED ACTIONS

Much of the area that may be affected is privately owned, and recreational activities on privately-owned lands are limited. Short-term effects on recreational opportunities at public access sites are possible due to construction activities. Construction sites may create short-term public safety concerns for recreationists such as kayakers, canoeists, hikers, and anglers. Mitigative measures for recreation incorporated into proposed actions (Appendix A, Code R) should avoid or minimize adverse affects. The proposed project actions will contribute to the long term goal of restoring Deer Creek. Long-term effects of these actions would improve salmonid populations and riparian vegetation, which would increase recreational opportunities and enjoyment. Increased tourism and recreation would have a positive impact on the associated retail sales and service industries. However, because public access to the creek is limited by private property,



these benefits would be limited. Potential environmental effects and corresponding mitigation measures for recreation are summarized in Appendix D.



5.0 CUMULATIVE IMPACTS

Cumulative effects are the effects on the environment that result from the incremental accumulation of past, present and reasonably foreseeable future actions undertaken by the same or other agencies or persons. Cumulative effects can result if a action's effects, together with the effects of other similar actions, are cumulatively substantial. In the case of a multi-action program, cumulative effects can occur from both the sum of action effects within the program, (i.e., the Proposed Actions), and from the sum of the program's effects with the effects of other related programs.

PROPOSED ACTIONS

The Proposed Actions constitute an ecosystem-level approach that considers the physical environment, biological environment, and human environment. Development of the Proposed Actions evaluated the watershed as a whole, recognizing the interdependencies of stream hydrology, sedimentation, riparian vegetation, aquatic and terrestrial wildlife (including rare and sensitive species), and human-induced influences. Therefore, other aspects of the human environment, in addition to anadromous fish, would benefit from restoration actions.

Proposed actions would generally be implemented in a phased approach as site-specific needs are identified, designs are completed, funding is acquired, and site-specific environmental compliance is completed. The use of adaptive management would also tend to spread implementation of approved actions over time as results of previously implemented actions are monitored and additional needs for action are determined. Because only a few of the actions would likely be implemented in any one year, and all actions would incorporate mitigation and conservation measures, the temporary and minor adverse effects that may occur at construction sites would not be expected to substantially accumulate throughout the watershed.

Cumulative actions to improve stream corridor habitats throughout the watershed are expected to provide long-term benefits to associated vegetation and wildlife. These improvements, such as restoration of habitat continuity in the riparian corridor, would contribute to the goals of several plans and programs for restoration of the watershed ecosystem. However, because vegetation communities and wildlife habitats in lower Deer Creek have been substantially modified to suit human land uses, and will likely continue to be modified as human populations increase, cumulative benefits from proposed actions would not be substantial relative to the No-Action Alternative. Habitat enhancements in lower Deer Creek would contribute towards the goals of several Central Valley-wide programs for protecting, enhancing, and restoring riparian habitats within the overall Central Valley, but relative to the magnitude of restoration needs in the Central Valley, effects of lower Deer Creek actions over the 10-year implementation period would not be substantial.

The proposed actions considered together would be expected to improve fish passage and instream habitat and contribute toward AFRP and State goals (USFWS 1995c and CA Resources



Agency 1989, respectively) for doubling populations of salmon and steelhead trout in the Central Valley. However, the effects of Deer Creek actions would be relatively minor, because the magnitude of fisheries restoration actions needed throughout the Central Valley to meet the population doubling goal is substantial. The magnitude of benefits expected from salmonid habitat improvement actions in lower Deer Creek is difficult to estimate. Monitoring and adaptive management over time will be required to determine cause and effect of population changes relative to implemented actions. Fisheries habitat within the watershed should improve with the proposed action but will likely continue to be modified as human populations increase. In addition, fisheries habitat conditions outside the scope of the Proposed Actions (e.g., environmental conditions in the Sacramento River, Delta, and San Francisco Bay) may continue to impact anadromous fish. Therefore, cumulative net benefits in the watershed from Proposed Actions implemented over a 10-year implementation period may not be substantial relative to the No-Action Alternative.

Agricultural land conversions to riparian and other native habitats could accumulate and reduce County tax revenue. However land conversion acreage would be small (less than 0.1-0.2 percent) relative to the total acreage of the land types in Tehama County (Table 3). No accumulation of adverse effects to landowners is anticipated.

RELATED ACTIVITIES

The following programs have goals similar to the Proposed Actions. The implementation of these related activities during the 10-year period of the EA would be expected to increase cumulative beneficial effects for fish and wildlife in the Action Area.

Stakeholder Watershed Management Plans

A watershed management strategy has been developed by the DCWC to identify and resolve management problems within the watershed. The plan shares a concern for protecting, enhancing, and restoring aquatic and riparian habitats, while maintaining landowner rights and multiple use of land and water. The DCWC plan was used to develop the proposed action.

Mill and Deer Creeks Protection Act (AB 1413)

In 1995, the DCWC, Mill Creek Conservancy, and Friends of the River successfully created legislation AB 1413 to prohibit construction of new dams, diversions, or other water impoundment facilities on Deer Creek from the headwaters (within Section 11 T27N, R5E) to the United States Geological Survey gauging station (within Section 23 T25N, R1W). AB 1413 provides protection functionally equivalent to the wild and scenic designation.



CVPIA Anadromous Fish Restoration Program

Section 3406(b)(1) of the Central Valley Project Improvement Act (CVPIA) (P.L. 101-575) requires the Secretary of Interior; in consultation with other State and Federal agencies, Indian tribes, and affected interests; to "develop within 3 years of enactment and implement a program which makes all reasonable efforts to ensure that, by the year 2002, natural production of anadromous fish in Central Valley rivers and streams will be sustainable, on a long-term basis, at levels not less than twice the average levels attained during the period of 1967-1991..." Section 3406(b)(1)(A) requires that the program "give first priority to measures which protect and restore natural channel and riparian habitat values through habitat restoration actions ..." This program, called the Anadromous Fish Restoration Program (AFRP), produced a draft Restoration Plan in 1995, which was revised in 1997. The Proposed Actions in this PEA are consistent with the Plan's recommendations for Deer Creek (USFWS 1997). As of 1998, AFRP actions on Deer Creek have included two land acquisitions for riparian habitat preservation; monitoring studies for water temperature, water quality, and instream flows; and funding to enable the DCWC to produce a Watershed Management Strategy Plan. The AFRP will likely fund additional projects on Deer Creek in the future.

CVPIA Anadromous Fish Screen Program

The CVPIA [Section 3406(b)(21)] Anadromous Fish Screen Program is targeted at anadromous fish entrainment reductions through screening unscreened diversions and upgrading inadequate fish screens throughout the State. This activity is designed to reduce anadromous fish losses at water diversion sites. Reducing entrainment losses has the potential to increase populations by reducing juvenile fish take. Nothing is planned in the watershed at this time.

CVPIA and CDFG Anadromous Fish Spawning Gravel Programs

The CVPIA [Section 3406(b)(13)] and CDFG anadromous fish gravel replacement efforts are designed to improve and expand potential spawning and rearing habitats to increase population levels. The CVPIA program is focused on spawning habitats on the Sacramento River below Keswick Dam, American River below Nimbus Dam, and Stanislaus River below Goodwin Dam.

Department of Interior Water Acquisition Program

The Department of Interior Water Acquisition Program under CVPIA sections 3406(b)(3) and 3406(d)(2) is targeted at providing level 4 refuge water supplies and supplementing instream flows. The program acquires water from willing sellers to augment instream flows and provide level 4 supplies to refuges throughout the State. Additionally, the AFRP is implementing actions in the Delta designed to improve anadromous salmonid habitat and survival as fish leave tributaries and migrate through the mainstem San Joaquin River and the Delta. The water



acquisition program has studied the hydrology and water rights of Deer Creek and other Central Valley watersheds, and may take action to acquire, on a willing-seller basis, short-term, long-term, or permanent water to supplement instream flows for fish in Deer Creek and other Central Valley streams.

CVPIA Dedication and Management of 800 TAF of CVP Yield

The CVPIA [Section 3406(b)(2)] directive to dedicate and manage 800,000 acre-feet of CVP yield has the primary purpose of implementing the fish, wildlife, and habitat restoration measures identified in the CVPIA. It is unlikely that actions taken under this directive would directly affect the Deer Creek watershed.

CALFED Bay-Delta Ecosystem Restoration Program Plan

The mission of the CALFED Bay-Delta Program is to develop a long-term comprehensive plan that will restore ecosystem health and improve water management for beneficial uses of the Bay-Delta system. CALFED's goal for ecosystem quality is to improve and increase aquatic and terrestrial habitats and improve ecological functions in the Bay-Delta to support sustainable populations of diverse and valuable plant and animal species. The CALFED Ecosystem Restoration Program Plan (ERPP) addresses this goal. The foundation of the program is restoration of ecological processes that are associated with streamflow, stream channels, watersheds, and floodplains. Additionally, the program aims to reduce the effects of stressors that inhibit ecological processes, habitats, and species. Deer Creek has been selected as a demonstration stream for ERPP implementation. ERPP actions on Deer Creek would address restoration of natural floodplain functions, acquisition of supplemental water from willing sellers to facilitate fish migration, and protection and restoration of the riparian corridor in the valley reach of the creek.

Upper Sacramento River Fisheries and Riparian Habitat Management Plan

To help reverse trends of declining salmon runs and loss of riparian habitat in the upper Sacramento River system, Senate Bill 1086 was passed into law in 1986. This law established an advisory Council representing a wide range of Federal, State, and local agencies and private interests. The law required the Council to develop a plan to establish a series of priority actions for the upper Sacramento River and its tributaries between the Feather River and Keswick Dam. The plan, completed in 1989, describes specific actions to help restore the Sacramento River fishery to its optimum state and protect and restore riparian habitat. The plan is consistent with and complementary to Senate Bill 2261; the Salmon, Steelhead Trout, and Anadromous Fisheries Program Act of 1988; which has the goal of doubling "... the current natural production of salmon and steelhead trout resources..." by the end of the century.



Restoring Central Valley Streams: A Plan For Action

The specific goals of this plan developed by CDFG in 1993 are to restore and protect California's aquatic ecosystems that support fish and wildlife, and to protect threatened and endangered species. These goals were presented in Governor Pete Wilson's April 1992 water policy statement, and incorporate the State-legislated mandate and policy to double populations of anadromous fish in California (Senate Bill 2261: Salmon, Steelhead Trout and Anadromous Fisheries Program Act). The plan encompasses all Central Valley waters accessible to anadromous fish outside of the Sacramento-San Joaquin Delta, including Deer Creek.

Lassen Land and Resource Management Plan (LRMP)

Most of the Deer Creek watershed upstream of the Action Area is owned by the Lassen National Forest and managed by the U.S. Forest Service. The LRMP is required by the Forest Rangeland Renewable Resources Planning Act of 1974, and was adopted in 1993. The purpose of the LRMP is to define resources in different parts of the Forest, establish Forest goals and objectives for commodities and services to be provided, and prescribe standards, guidelines, and practices to achieve the goal and objectives. Among standards and guidelines are measures to protect habitat for anadromous and resident fisheries along Deer Creek and its tributaries, pursue the opportunity with private landowners to improve stream conditions through management of livestock, protect riparian habitat and riparian management zones, protect sensitive plants animals and habitats, and preserve the "outstandingly remarkable" values of Deer Creek until there is congressional action on the Creek proposed to include it into the Wild and Scenic Rivers System (USDA 1992).

Interim Strategies for Managing Anadromous Fish-Producing Watersheds on Federal Lands in Eastern Oregon and Washington, Idaho, and Portions of California (commonly referred to as PACFISH)

The U.S. Forest Service and BLM developed an interim strategy to manage for the decline of anadromous fish in watersheds of Federal lands, including Deer Creek. The interim management strategy was designed to prevent further endangerment to sensitive anadromous fish. Included in the strategy is an establishment of riparian goals and management objectives delineating riparian habitat conservation areas, and establishing standards and guidelines for managing timber, roads, grazing, recreation, minerals, fire/fuels, fisheries and wildlife restoration, and the general watershed.



The Redding Resource Management Plan (RMP)

The BLM has included Deer Creek canyon in the Ishi Management Area of its RMP. Under this plan, the canyon would be managed to maintain or improve fisheries habitat, protect raptors, and maintain primitive recreational opportunities.

Environmental Quality Incentives Program (EQIP)

Established in 1996, EQIP is a voluntary conservation program with the Natural Resource Conservation Service (NRCS) for farmers and ranchers. NRCS provides technical and financial assistance to participants to address resource concerns. Cost-sharing may be up to 75 % NRCS and will require a minimum of 5 years commitment to a conservation plan. Deer Creek is currently a priority area for the EQIP program.

Wildlife Habitat Incentives Program (WHIP)

WHIP is also a voluntary conservation program with the NRCS and has similar goals to the EQIP program. However, this program is not restrictive to only farmers and ranchers. NRCS will provide technical and financial assistance to participants who want to help establish and improve fish and wildlife habitat. Cost-sharing may be up to 75 % NRCS and will require a minimum of 5 years commitment to a conservation plan. Deer Creek is currently a priority area for the WHIP program.

Stakeholder Watershed Management Plans

A watershed management strategy has been developed by the Deer Creek Conservancy Creek Watershed Conservancy to identify and resolve watershed management problems within the watershed. Like the other programs, these programs share a concern for protecting, enhancing, and restoring aquatic and riparian habitats, while maintaining landowner rights and multiple use of land and water. Actions proposed for implementation would likely be consistent with CALFED's ERPP, the Service's AFRP, and other Federal and State restoration programs.



6.0 ENVIRONMENTAL COMPLIANCE

The PEA was prepared in accordance with applicable laws and executive orders, and provides programmatic coverage for environmental compliance in the Deer Creek watershed. Prior to implementation of site-specific projects under this PEA, site-specific environmental assessments (EAs), permits, and other authorizations may be required, and project proponents will need to comply with applicable executive orders and legislative acts. The PEA has been prepared in a manner to maximize the ability of future environmental documents to incorporate significant amounts of information by reference. These actions could adopt the PEA as a base document and extend from its coverage to avoid duplication (a process termed "tiering" under NEPA guidelines). Future documents that could tier from the PEA include site-specific EAs, documents required under the California Environmental Quality Act (CEQA), and applications for permits.

FEDERAL LAWS, EXECUTIVE ORDERS, AND REGULATIONS

National Environmental Policy Act (NEPA)

The PEA was prepared pursuant to regulations implementing NEPA (42 USC 4321 *et seq.*). NEPA provides a commitment that Federal agencies will consider the environmental effects of their actions. The PEA provides information regarding the No-Action Alternative and Proposed Actions, environmental impacts, and associated mitigation measures to be incorporated into the actions. The PEA addresses the basic elements of specific and generalized habitat restoration actions and provides a framework under which actions can be analyzed for potential environmental effects using sets of diagnostic criteria. When project sites have been identified, lead agencies will consider project-specific actions prior to their implementation to determine if the specific impacts were fully analyzed in the PEA. If the actions would have no greater impacts than those analyzed in the PEA or would not require additional mitigation measures, the actions could be authorized under the PEA's coverage. In such cases, an administrative decision could be made that no further NEPA documentation is necessary. Other actions would require supplemental site-specific environmental documentation prior to decisions on their implementation.

Endangered Species Act (ESA)

The ESA of 1973, as amended (16 USC 1531 *et seq.*), establishes a national program for the conservation of threatened and endangered species of fish, wildlife, and plants and the preservation of the ecosystems upon which they depend. Section 7(a) of the ESA requires Federal agencies or federally funded actions to consult with the Service and NMFS on any activities that may affect any species listed as threatened or endangered under their jurisdiction. The PEA has described the potential effects of Proposed Actions on special status species and, through informal consultation with the Service and NMFS, has defined associated conservation



measures to bring adverse effects to a level of “not likely to adversely affect.” Ideally, specific actions proposed in the future would rely on information in the PEA to cover most, or all, ESA compliance needs. Projects meeting conditions identified in the PEA for special-status species should receive timely concurrence from the Service or NMFS. Additional informal or formal consultation on listed species would occur in situations where programmatic conservation measures would not be adequate for expected effects of a proposed action.

National Historic Preservation Act (NHPA)

Compliance with the NHPA (16 USC 470 *et seq.*) would be necessary for all Proposed Actions in areas listed, or that are eligible for listing, on the National Register for Historic Places. The Service, the Advisory Council on Historic Preservation, and the California SHPO, pursuant to section 800.13 of the regulations (36 CFR 800.13) implementing Section 106 of the NHPA, have entered into a Programmatic Agreement to streamline the cultural resource compliance process for low impact projects. Preliminary identification of cultural resource sites has not been requested at this time. The PEA has described the potential effects of Proposed Actions on cultural resources and has defined mitigative measures and compliance procedures that would be exercised at the site-specific level. Compliance for qualifying actions would be achieved through the Programmatic Agreement. Proposed Actions outside the scope of the Programmatic Agreement would follow the standard process for Section 106 of the NHPA, with review by SHPO, before proceeding to ensure that cultural resources are protected.

Farmland Preservation and Farmland Protection Policy Act of 1981

The U.S. Council on Environmental Quality Memoranda on Farmland Preservation and Farmland Protection Act of 1981 (7 USC 4201, 7 CFR 658) require Federal agencies preparing Environmental Impact Statements to include farmland assessments designed to minimize adverse effects on prime and unique farmlands. Although an EA need not address this administrative policy, effects of the Proposed Actions on agricultural lands are assessed in the Environmental Consequences section of this PEA.

Fish and Wildlife Coordination Act (FWCA)

The FWCA (16, USC 661 *et seq.*) provides for the equal consideration and coordination of wildlife conservation with other project features of federally funded or permitted water resource development projects. The Proposed Actions were developed under the authority of the CVPIA’s AFRP. The purposes of the CVPIA include “to protect, restore, and enhance fish, wildlife, and associated habitats...” and “to achieve a reasonable balance among competing demands for use of Central Valley Project water, including the requirements of fish and wildlife”; hence, the implementing authority fulfills the intent of the FWCA. A FWCA report on the proposed actions is not needed for the purpose of this PEA.



Clean Water Act

Section 404 of the Clean Water Act (33 USC 1344) requires that a Department of the Army permit be obtained from the U.S. Army Corps of Engineers for the discharge of dredged or fill material into the “waters of the United States,” including wetlands. Compliance would occur at the site-specific level. The PEA has described the potential effects of Proposed Actions on wetlands and other waters, and has defined mitigative measures that would be exercised at the site-specific level in order to facilitate permit issuance.

Protection of Wetlands--Executive Order 11990

Executive Order 11990 requires Federal agencies to follow avoidance, mitigation, and preservation procedures with public input before proposing new construction in wetlands. The PEA has identified mitigation measures that would be incorporated into Proposed Actions to avoid or minimize adverse effects on wetlands. Implementation of certain Proposed Actions could enhance wetlands or increase their area. Compliance with Executive Order 11990 would occur at the site-specific level, and would likely be coordinated with compliance for section 404 of the Clean Water Act, as appropriate.

Floodplain Management--Executive Order 11988

Executive Order 11988 requires that all Federal agencies take action to reduce the risk of flood loss; to restore and preserve the natural and beneficial values served by floodplains; and to minimize the impact of floods on human safety, health and welfare. The PEA has described the potential effects of Proposed Actions on floodplains, and has defined mitigative measures that would be exercised at the site-specific level in order to facilitate compliance. The Proposed Actions support the preservation and enhancement of the natural and beneficial values of floodplains. Final compliance with this Executive Order would occur at the site-specific level.

Environmental Justice In Minority and Low Income Populations--Executive Order 12898

Executive Order 12898 requires Federal agencies to identify and address disproportionately high and adverse human health and environmental effects of Federal programs, policies, and activities on minority and low-income populations. The assessment of Proposed Actions has considered the environmental, social, and economic impacts on minority and low-income populations. Final compliance with this Executive Order would occur at the site-specific level.



Indian Trust Assets, Indian Sacred Sites on Federal Land—Executive Order 13007, and American Indian Religious Freedom Act of 1978

These laws are designed to protect Indian Trust Assets; accommodate access and ceremonial use of Indian sacred sites by Indian religious practitioners, and avoid adversely affecting the physical integrity of such sacred sites; and protect and preserve the observance of traditional Native American religions, respectively. The Proposed Actions and their associated mitigation measures would not violate these protections. Preliminary identification of Indian Trust Assets has not been requested at this time. Final compliance with these laws would occur at the site-specific level.

STATE LAWS, EXECUTIVE ORDERS, AND REGULATIONS

The California Environmental Quality Act (CEQA)

The CEQA is a process similar to that required by NEPA, whereby State, regional, or local agencies would assess the environmental effects of proposed actions and circulate these assessments to other agencies and the public for comment before making decisions. Compliance with CEQA would be required when a State or local agency is solely or partially a sponsor for an action, or when State, regional, or local agency approval or discretion is required to implement an action. The PEA has provided programmatic information on the purpose and need for actions in the watershed, the affected environment, the Proposed Actions and associated mitigation and conservation measures, and the potential effects of Proposed Actions. Actions that would require CEQA compliance could adopt the PEA as a base document and extend from its coverage to expedite meeting CEQA requirements.

The California Endangered Species Act (CESA)

The CESA protects plant and animal species designated by the California Fish and Game Commission as either endangered or threatened. Compliance with section 2090 of CESA would be required for actions having a State lead agency. Section 2081 compliance may be required for actions implemented by local governments or private entities. The PEA has described the potential effects of Proposed Actions on State special status species and has defined associated conservation measures that could be incorporated into proposed actions to avoid or minimize adverse effects on these species. Specific proposed actions could reference information in the

PEA to help achieve timely CESA compliance. Compliance with CESA would require consultation with CDFG.



Clean Water Act

Section 401 of the Clean Water Act (33 USC 1344) requires that State water quality standards not be violated by the discharge of dredged or fill material into the “waters of the United States.” The California State Water Resources Control Board (SWRCB) and Regional Water Quality Control Board (RWQCB) must issue a certification, or waiver of certification, of compliance before the U.S. Army Corps of Engineers will issue a section 404 permit. Compliance with these regulations would occur at the site-specific level. To facilitate compliance the PEA has described the potential effects of Proposed Actions on wetlands and other waters, and has defined mitigative measures that could be exercised at the action site.

Other Water Quality Regulations

The SWRCB and RWQCBs are responsible for issuing permits under the National Pollutant Discharge Elimination System for industrial stormwater runoff, stormwater runoff from general construction activities, municipal stormwater runoff, and point-source discharges. Waste discharge permits are issued by the RWQCBs to regulate actions that may affect groundwater quality or that may discharge waste in a diffused manner. Compliance with these regulations would occur at the site-specific level. To facilitate compliance the PEA has described the potential pollution effects of Proposed Actions, and has defined mitigative measures that could be exercised at the action site.

Lake or Streambed Alteration Agreement

Authorization is required from CDFG under section 1601 for public actions and section 1603 for nonpublic actions prior to any action that substantially diverts, obstructs, or changes the natural flow of the river, stream, or lake, or uses material from the streambed. The PEA has defined general actions and associated mitigation measures that may affect streambeds. Specific information on these activities required for compliance would be addressed at the site-specific level.

State Historic Preservation Officer Consultation

Consultation with California’s SHPO under Section 106 of the NHPA would be necessary for all Proposed Actions in areas listed, or that are eligible for listing, on the National Register for Historic Places. Compliance for section 106 would be achieved through the Programmatic Agreement between the Service, the Advisory Council on Historic Preservation, and SHPO, as described under Federal compliance needs.



State Lands Commission Land Use Lease

Actions occurring on State sovereign lands, such as ungranted tidelands and submerged lands and beds of navigable Rivers streams, lakes, bays, estuaries, inlets, and straits, may require authorization from the State Lands Commission. The PEA has described the potential effects of Proposed Actions that may occur on State sovereign lands and has defined associated mitigation measures that could be incorporated to avoid or minimize adverse effects. Specific proposed actions could reference information in the PEA to help achieve timely compliance.

Reclamation Board Encroachment Permit

The Reclamation Board issues permits to maintain the integrity and safety of flood control project levees and floodways that were constructed according to the flood control plans adopted by the Board or the California Legislature. Actions that would affect existing State flood control project facilities, including levees, dams, reservoirs, floodways, and flood control plans would require permits. The PEA has described the potential effects of Proposed Actions on flood control and has defined associated mitigation measures that could be incorporated to avoid or minimize adverse effects. Specific proposed actions could reference information in the PEA to help achieve timely compliance.

Regulations Involving Dams and Reservoirs

Any proposal to construct or enlarge a dam or reservoir must obtain written approval from the CDWR Division of Safety of Dams for the plans and specifications. Actions that may require this approval include construction and modification of dams, levees, artificial ponds, or other structures that are under this jurisdiction. Plans and specifications for such actions would be submitted to CDWR at the site-specific level.

Encroachment Permit/Right-of-Way

The California Department of Transportation issues permits to encroach on land within its jurisdiction to ensure that the proposed encroachment is compatible with the primary uses of the State highway system. Actions occurring within a right-of-way would require this permit, which would be obtained at the site-specific level.

Air District Permits

Actions using facilities or equipment that emit air pollutants or that generate dust emissions must obtain permits to ensure that emissions from such sources will not interfere with the attainment or maintenance of ambient air quality standards adopted by the California Air Resources Board and



USEPA. The PEA has described the potential effects of Proposed Actions on air quality and has defined associated mitigation measures that could be incorporated to avoid or minimize adverse effects. Specific proposed actions could reference information in the PEA to help achieve timely compliance.

Local Regulatory Compliance

Cities and counties in California have adopted local zoning ordinances and general plans that set policy on how land development will occur within their respective jurisdictions. Approvals and entitlements at the city or county level, such as conservation easements, grading permits, building permits, special or conditional use permits, subdivision map approvals, specific plans, zoning ordinance amendments, and local general plan amendments may be required for certain actions. CEQA compliance may be required for grading and building permits if they are discretionary and is normally required for approvals and entitlements. Specific proposed actions could reference information in the PEA to help achieve timely compliance.



7.0 PUBLIC INVOLVEMENT

The purpose of public involvement is to inform the public of proposed actions, exchange information with all potentially affected stakeholders in the planning process, and identify practical alternatives.

Public participation has played an important role in developing the proposed actions, recommended in both the AFRP's Revised Draft Restoration Plan and the DCWC's *Deer Creek Watershed Management Plan*. After release of the AFRP's Draft Restoration Plan in December 1995, the cooperating agencies engaged in a substantial public outreach effort. This included a public scoping workshop held by the AFRP in Chico during February 1996 to provide public comment opportunities and address public issues and concerns. Additional written comments were received by the AFRP on the 1995 Draft Anadromous Fish Restoration Plan (USFWS 1995d) during the designated December 1995 through March 1996 comment period (public comments and the Service's responses are documented in Appendices H and I of the Revised Draft Restoration Plan (USFWS 1997).

The DCWC recently completed an open planning process, resulting in the publication of the their *Deer Creek Watershed Management Plan* (DCWC 1998a). The DCWC held 8 - 10 public workshops throughout 1996 and 1997 during the development of the Plan. The Plan consists of an Existing Conditions Report of the watershed and a Watershed Management Strategy (DCWC 1998b). The Watershed Management Strategy combines issues and concerns identified during the planning process with management objectives. Recommendations were derived from multiple sources, including watershed stakeholders, AFRP objectives for Deer Creek (USFWS 1997), the CALFED Ecosystem Restoration Program Plan (CALFED 1999a and 1999b), and CDFG's Restoring Central Valley Streams: A Plan for Action (CDFG 1993).

A Notice of Availability for this Draft PEA and Draft Finding of No Significant Impact (FONSI) for public review has been provided to the local media. All comments will be considered in preparation of the final PEA.



COORDINATION AND CONSULTATION

Coordination and consultation in preparing the PEA included the following:

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Sacramento Fish and Wildlife Office, Sacramento, CA

Sacramento-San Joaquin Estuary Fishery Resources Office, Stockton, CA

Sacramento Realty Field Office, Sacramento, CA

Region I Cultural Resources Team, Sherwood, OR

National Marine Fisheries Service, Santa Rosa, CA

U.S. Forest Service, Lassen National Forest, Susanville, CA

U.S. Bureau of Land Management, Redding Resource Area, Redding, CA

U.S. Bureau of Reclamation, Mid-Pacific Region, Sacramento, CA

California Department of Fish and Game

Region II, Rancho Cordova, CA

Inland Fisheries Division, Red Bluff, CA

Deer Creek Watershed Conservancy, Vina, CA

The Nature Conservancy, Red Bluff, CA



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Appendix A. Associated mitigation and conservation measures

| Code | Mitigation and Conservation Measures |
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| | <p>Vegetation and Wildlife</p> <p>VW1 All activities will be implemented in coordination with protection of existing habitat.</p> <p>VW2 All activities will be implemented during the least detrimental time of year; e.g., low streamflow periods.</p> <p>VW3 All activities will be completed in a timely manner.</p> <p>VW4 All contractors and equipment operators will be given written and oral instructions to avoid impacts and be made aware of ecological values of the site.</p> <p>VW5 Pre-construction field surveys will be conducted during suitable seasons by qualified personnel to identify any sensitive plants or sensitive areas (such as wetlands, riparian zones, native habitat, vernal pools, and special status species habitat) at or near the project site.</p> <p>VW6 Pre-construction field surveys will be conducted by qualified personnel to confirm that no sensitive terrestrial wildlife occur within one-half mile of the project site.</p> <p>VW7 If pre-construction surveys should identify sensitive habitats, those areas will be flagged, isolated, and avoided during the construction process.</p> <p>VW8 A biological monitor will be on site at all times during construction. The monitor will check the site before construction each day for sensitive wildlife; assist in avoiding impacts to fish, wildlife, and habitats; determine the least damaging options for removal or transplantation of vegetation according to established protocols; and provide technical information.</p> <p>VW9 Existing access points will be used whenever possible in order to avoid sensitive locations.</p> <p>VW10 Least sensitive areas will be used for parking, construction activities, stockpiling, and staging areas, and these areas will be clearly marked and restored following construction.</p> <p>VW11 Unavoidable damage to wildlife habitat will be mitigated according to the Service’s Mitigation Policy.</p> |



| Code | Mitigation and Conservation Measures |
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| | Vegetation and Wildlife (Continued) |
| VW12 | Disturbed sites will be revegetated. All planted vegetation will be with species native to, and collected in, the area, as appropriate. |
| VW13 | When feasible, native vegetation will be salvaged from areas where ground disturbances occur, and replanted. |
| VW14 | Vegetative planting techniques will not cause major disturbances to soils and slopes. |
| VW15 | Fast growing willows, alders, and others species will be planted at stream edges, as appropriate, to minimize recovery time and provide shade to near-shore portions of the stream. |
| VW16 | Excavating, filling, and other earth moving will be done in a gradual manner to allow wildlife species to escape in advance of machinery and moving materials. |
| VW17 | Topsoil removed for excavations will be retained, stockpiled, and re-spread. |
| VW18 | Surveying and monitoring activities will be designed and conducted to minimize disturbance of wildlife and their habitat. |
| VW19 | Environmental protections at borrow sites will be the same as at project construction sites. |
| VW20 | Riparian vegetation or wetlands isolated from water supplies by altered hydrology will be provided with replacement water supplies. |



| Code | Mitigation and Conservation Measures |
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| | Fisheries and Water Quality |
| FWQ1 | Fish passage on a stream will not be obstructed at any time. |
| FWQ2 | Fish remaining in dewatered areas will be returned to the creek. |
| FWQ3 | If cofferdams are used, only screened pumps will be used to de-water the construction area. The channel will be rewatered incrementally to minimize turbidity and sedimentation. |
| FWQ4 | Instream construction activities must be minimized to reduce sedimentation. |
| FWQ5 | Avoid construction during the rainy season or high flows to the degree possible. Construction should occur during the late summer low-flow season when sediment will settle out quickly. |
| FWQ6 | Silt curtains, silt fences, settling basins, sandbags, check-dams, straw bales, and other erosion control devices to will be used as necessary to minimize sediment impacts to waters. Turbidity will be monitored to meet exceedence thresholds established by project's water quality waiver agreement with the Regional Water Quality Control Board, as applicable. |
| FWQ7 | Any machinery that enters the river during work will be steam-cleaned and properly maintained to avoid water quality contamination from the release of grease, oil, petroleum products, or other nonnative materials. |
| FWQ8 | Only clean gravel, washed of silt and fines will be placed into streams. Rewatering the stream channel after construction will be done incrementally to avoid mobilization of sediments and increases in turbidity. |
| FWQ9 | Surveying and monitoring activities will be designed and conducted to minimize disturbance of fish habitat. Should the collection of data on redds require surveyor boats, monitors will travel only downstream to minimize disturbance of salmon redds. |



| Code | Mitigation and Conservation Measures |
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| | <p>Special Status Species</p> <p>SS1 <u>Aleutian Canada goose (<i>Branta canadensis leucopareia</i>)</u> Aleutian Canada geese winter in wetlands and cropland on the Central Valley floor. Where project sites are located on or within 1/4 mile of active resting and foraging sites, work activities above ambient noise levels will not occur during the bird's normal wintering and migration period, from October 1 to May 14.</p> <p>SS2 <u>Bald eagle (<i>Haliaeetus leucocephalus</i>)</u> Bald eagles usually nest in uneven-age (multi-storied) stands of mixed conifers near bodies of water. Nest trees in California are typically mature, large ponderosa or sugar pines between 41 to 46 inches in diameter. Surveys should be conducted in any suitable nesting habitat. If there are any bald eagle nests within 0.5 miles with a direct line of sight to the activity, implement a seasonal restriction on project activities that could disturb nesting birds from January 15 through July 31.</p> <p>SS3 <u>American peregrine falcon (<i>Falco peregrinus anatum</i>)</u> Peregrine falcons nest almost exclusively on cliffs usually near water. Preferred cliffs are typically 150 ft or more in height with a small cave or overhung ledge. Peregrines have nested from near sea level to over 11,000 ft. Survey any suitable cliff habitat within 0.5 miles of the project area. If there are peregrine nests within 0.5 miles with a direct line of sight to the activity, implement seasonal restriction on project activities that could disturb nesting birds from February 1 through August 1.</p> <p>SS4 <u>California red-legged frog (<i>Rana aurora draytonii</i>)</u> Red-legged frogs may occur in creeks, ponds and marshes, often with cattails, tules, and willows. If habitat is present, a red-legged frog survey will be conducted at least six months before construction begins. If red-legged frogs are found and habitat may be affected, consultation with the service will be required. Before construction, work crews will review one-page guidance on identifying red-legged frogs and bullfrogs, and will be instructed to be observant for frogs at project sites. All ponds or reaches of creeks where cattails or tules grow will be avoided. All stands of willows will be fenced to prevent intrusion by workers or machinery. Placement of gravel or other materials into red-legged frog habitat will be done gradually from the water's edge out into the stream or pond to allow frogs to escape. If red-legged frogs are observed during construction activities, the area where frogs were seen completely avoid until a Service biologist has been notified.</p> |



| Code | Mitigation and Conservation Measures |
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| <p>SS5</p> | <p>Special Status Species (Continued)</p> <p><u>Valley elderberry longhorn beetle (<i>Desmocerus californicus dimorphus</i>)</u> The beetles primarily occur with elderberry plants (<i>Sambucus</i> spp.) in riparian habitats, although any elderberry plant with one or more stems measuring 1.0 inch or greater in diameter at ground level are considered habitat. Surveys will be conducted on project sites at least six months before construction activities to locate elderberry plants. Elderberry plants will be avoided if possible. If elderberry plants cannot be avoided consultation with the Service will be required. An incidental take permit from the Service will be necessary to remove or transplant elderberry plants. Transplanting of elderberry plants will follow 1999 protocols and will be included in the revegetation plan. Sixty days before construction, a pre-construction survey will be conducted to flag remaining elderberries. During construction bright orange construction fencing or similar material will temporarily fence plants so they are not disturbed. The fence will run at least 20 ft from the dripline of any elderberry plant with one or more stems measuring 1.0 inch or greater in diameter at ground level.</p> |
| <p>SS6</p> | <p><u>Conservancy fairy shrimp (<i>Branchinecta conservatio</i>);</u> <u>vernal pool fairy shrimp (<i>Branchinecta lynchi</i>);</u> <u>vernal pool tadpole shrimp (<i>Lepidurus packardi</i>)</u></p> <p>Listed vernal pool crustaceans may occur in vernal pools, vernal swales, and other seasonal wetlands that pond water for three weeks or more. Once identified in the pre-construction survey, vernal pools will be surrounded with bright orange fencing to prevent disturbance. Construction activities will be avoided within 250 ft of pool margins and swale edges. Activities beyond 250 ft will be avoided if they could eventually result in adverse effects to the pools and swales through changes in hydrology, sedimentation, or contamination of the habitat. If pools or swales cannot be avoided, the Service will be notified in writing as soon as possible, and information provided to the Service as requested. A biological monitor will be on site at all times during construction to assist in avoidance of impacts to sensitive species and provide technical information. Following construction, uplands will be restored to their previous condition whenever possible. Revegetation plant species will include only those that do not compete with native vernal pool plant species.</p> |



| Code | Mitigation and Conservation Measures |
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| <p>SS7</p> <p>SS8</p> | <p>Special Status Species (Continued)</p> <p><u>Greene's tuctoria (<i>Tuctoria greenei</i>);</u> <u>Hoover's spurge (<i>Chamaesyce hooveri</i>);</u> <u>hairy Orcutt grass (<i>Orcuttia pilosa</i>);</u> <u>slender Orcutt grass (<i>Orcuttia tenuis</i>);</u> <u>Butte County (Shippee) meadowfoam, <i>Limnanthes floccosa ssp. californica</i>:</u> Habitats and conservation measures for vernal pool and vernal swale plant species are the same as for vernal pool crustaceans described above.</p> <p><u>Giant garter snake (<i>Thamnophis gigas</i>)</u> Giant garter snake may occur in permanently aquatic habitat or habitats seasonally flooded during the snakes active season (early-spring through mid-fall), such as marshes, sloughs, ponds, low gradient streams, irrigation and drainage canals, and rice fields. If habitat is present, a giant garter snake survey will be conducted at least six months before construction begins. If giant garter snakes are found or their habitat may be affected, consultation with the service will be required.</p> <p>Construction activity within giant garter snake habitat will be limited to May 1 through October 1, when the snakes are usually active. Other construction times would require additional guidance from the Service to determine if additional measures are necessary, as giant garter snakes are more susceptible to take when occupying underground burrows or crevices. The project will be surveyed for the snake 24-hours prior to construction activities, and any sightings reported to the Service. Survey of the project area will be repeated if a lapse in construction activity of two weeks or greater has occurred. Construction personnel will receive Service-approved worker awareness training to instruct workers to recognize the snake and its habitat.</p> <p>Giant garter snake habitat within and adjacent to construction sites will be flagged as environmentally sensitive areas. Movement of heavy equipment to and from project sites, staging areas, or borrow sites will be confined to existing roadways to minimize habitat disturbance. Equipment and construction activities will keep at least 200 ft from giant garter snake aquatic habitat to avoid impacts. If construction activities must occur less than 200 ft from habitat, the effected area will be confined to the minimum necessary for construction activities. A Service-approved biologist will be on site during clearing and grubbing of wetland vegetation. Any dewatered habitat will remain dry for at least 15 consecutive days after April 15 and prior to excavating or filling of the dewatered habitat. If a snake is encountered during construction, activities will stop until it successfully escapes the project area or until capture and relocation have been completed by a Service-approved biologist. Disturbed areas will be returned to pre-project conditions following construction.</p> |



| Code | Mitigation and Conservation Measures |
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| <p>SS9</p> | <p>Special Status Species (Continued)</p> <p><u>Winter-run chinook salmon (<i>O. tshawytscha</i>);</u> <u>Winter-run chinook salmon critical habitat;</u> <u>Central Valley fall-run/late fall chinook salmon critical habitat;</u> <u>Central Valley fall-run chinook salmon (<i>O. tshawytscha</i>);</u> <u>Central Valley spring-run chinook salmon (<i>O. tshawytscha</i>);</u> <u>Central Valley steelhead (<i>Oncorhynchus mykiss</i>);</u></p> <p>Construction activities will be timed to occur when juvenile and adult life stages are most scarce, in-migration and out-migration are at their lowest points, and spawning and incubation are not occurring. Construction occurring between are likely to avoid direct effects to the greatest extent possible. Any new diversions will be screened per CDFG and NMFS criteria. General measures listed for Fisheries and Water Quality and Hydrology and Stream Channel will also contribute to avoidance and minimization of adverse effects, such as sedimentation, to special status salmonids. Riparian vegetation providing shaded riverine aquatic habitat will be protected during construction and will be mitigated if damage is unavoidable.</p> |
| <p>SS10</p> | <p><u>Delta smelt (<i>Hypomesus transpacificus</i>):</u> Delta smelt do not occur within the watershed, however water quality can be affected by significant changes in watershed hydrology, as the smelt’s habitat occurs downstream. Any proposed structural or operational action will be designed to keep changes in timing and quantity of watershed flows into the Sacramento River nil or minimal.</p> |
| <p>SS11</p> | <p><u>Sacramento splittail (<i>Pogonichthys macrolepidotus</i>):</u> Any new diversions will be screened per CDFG and NMFS criteria or operated to minimize entrainment if Sacramento splittail are present. Any proposed structural or operational action will be designed to keep changes in timing and quantity of watershed flows into the Sacramento River nil or minimal. During the March through May spawning period, shallow waters with submerged vegetation, such as backwaters, sloughs, ponds connected to the stream channel will be avoided to the extent possible during construction. Riparian vegetation providing shaded riverine aquatic habitat will be avoided to the extent possible and will be repaired if damage is unavoidable.</p> |



| Code | Mitigation and Conservation Measures |
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| | <p>Special Status Species (Continued)</p> <p>SS12 <u>Western yellow-billed cuckoo (<i>Coccyzus americanus occidentalis</i>):</u> The western yellow-billed cuckoo forages and breeds in dense riparian forest with a thick understory of blackberry and willows. They may breed from June through early September. A search of the California Department of Fish and Game Natural Diversity Database (CNDDDB) listed four records of this species in the Vina quadrangle, all on the Sacramento River (CNDDDB 1999). Site surveys will be conducted to identify nesting activity in suitable habitat. If nests are located within 0.5 miles of the project site with a direct line of sight to the activity, consultation with CDFG will be required to establish appropriate mitigation. Seasonal restrictions on project activities may be appropriate.</p> <p>SS13 <u>Bank swallow (<i>Riparia riparia</i>):</u> Bank swallows prefer soft-textured vertical river banks to make burrows for their colonies. They breed from early May through July. A search of the California Department of Fish and Game Natural Diversity Database (CNDDDB) listed nine records of this species in the Vina quadrangle, all on the Sacramento River (CNDDDB 1999). Site surveys will be conducted to identify colonies in appropriate habitat. If colonies are located within 0.5 miles of the project site they will be flagged and avoided during construction. CDFG will be consulted to establish appropriate conservation. Seasonal restrictions on project activities may be appropriate.</p> <p>SS14 <u>Swainson's hawk (<i>Buteo swainsoni</i>):</u> Swainson's hawks nest in the large trees of the lowlands of the Central Valley such as oaks, cottonwoods and walnuts. The nesting areas are in association with hunting grounds of open native grassland. Swainson's hawks arrive to breed from about March to April and chicks generally fledge around early July. A search of the CNDDDB listed two records of this species in Vina quadrangle, neither one on Deer Creek. Site surveys will be conducted to identify nesting activity in suitable nesting habitat (CNDDDB 1999). If nests are located within 0.5 mile of the project site with a direct line of sight to the activity, CDFG will be consulted to establish appropriate mitigation. Seasonal restrictions on project activities may be appropriate.</p> |



| Code | Mitigation and Conservation Measures |
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| | <p>Hydrology and Stream Channel</p> |
| HSC1 | Projects will be planned and designed based on geomorphological analysis. |
| HSC2 | Work within stream channels will be minimized, to the extent possible. |
| HSC3 | If stream flows are accelerated due to riprap or other bank protection, wing-deflectors or other measures will be considered on opposite and downstream banks; ends of riprapped areas will be stabilized to prevent erosion. |
| HSC4 | Streambanks will be contoured appropriately to provide stability. |
| HSC5 | Plantings of riparian vegetation will be designed to not adversely affect flood storage space or hinder flood flows that must be maintained to prevent flood damage. |
| HSC6 | Proposed actions will be designed to be compatible with existing flood control systems and be coordinated with local flood control entities. |
| HSC7 | Proposed actions will comply with established local flood control regulations. |
| | <p>Air Quality and Noise</p> |
| AQN1 | Construction sites will be watered to control dust. Fume-emitting equipment will not be operated excessively near developed areas. |
| AQN2 | Construction machinery will be equipped for noise suppression using modern mufflers and proper operating conditions. Nearby residents will be contacted prior to project construction. Noisy machinery will be placed as far away from developed areas as possible. Hours of construction will be limited to regular work hours when near developed areas. Machinery will be shut off when not in use. |
| | <p>Recreation</p> |
| R1 | Project activities will be limited to weekdays whenever possible and will be completed as soon as possible to minimize temporary impairment of recreational opportunities during construction. |
| R2 | Appropriate signs will be used to warn recreationists of construction activities and potentially hazardous conditions. |
| R3 | Actions involving grading, terracing, or creating structures will be designed to blend into the landscape to every extent possible, and to appear as natural or visually pleasing as possible. Construction sites will be kept clean and orderly. |



| Code | Mitigation and Conservation Measures |
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| <p>SC1</p> <p>SC2</p> <p>SC3</p> <p>SC4</p> <p>SC5</p> | <p>Socioeconomic Conditions</p> <p>Under all land use agreements, landowners would be monetarily compensated based on real estate appraisals of fair market value and land use rights acquired, as provided by the Uniform Appraisal Standards for Federal Land Acquisition, 1973. The more rights that are obtained in an easement, the greater the payment to the landowner.</p> <p>Land use rights acquired from landowners would consider the site-specific conservation needs and the land use needs of the landowner. Only those rights necessary for protection or restoration of habitat would be acquired by the easement.</p> <p>Conserving habitat through fee titles may reduce county tax revenue because of potential decreases in market value of conserved land. However, if fee titles are acquired by the Service, the Service would annually reimburse Tehama county to offset revenue lost through the Refuge Revenue Sharing Act (Public Law 95-469). This law states that the Secretary of the Interior shall pay out to Tehama county the greater of the following amounts:</p> <ul style="list-style-type: none"> m. An amount equal to the product of 75 cents multiplied by the total acreage of that portion of the fee area which is located within such county; or n. An amount equal to three-fourths of one percent of the fair market value, as determined by the Secretary, for that portion of the fee area which is located within such county; or o. An amount equal to 25 percent of the net receipts collected by the Secretary in connection with the operation and management of such fee area during such fiscal year. However, if a fee area is located in two or more counties, the amount for each county shall be proportioned in relationship to the acreage in that county. <p>Congress may appropriate, through the budget process, supplemental funds to compensate local governments for any shortfall in revenue sharing payments. The Act also requires that the Service land be reappraised every 5 years to ensure that payments to local governments remain equitable. Payments under the Refuge Revenue Sharing Act would be made only on lands which the Service acquires through fee purchase, transfer, or donation fee title. On lands where the Service might acquire partial interest through easement, all taxes will remain the responsibility of the individual landowner.</p> <p>Local contractors would be hired for the construction activities to the extent practicable to benefit local economies.</p> <p>Revegetation plans will incorporate measures to minimize the potential for establishment and spread of noxious weeds. Noxious weeds that may become established will be controlled as necessary.</p> |



| Code | Mitigation and Conservation Measures |
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| | Cultural Resources |
| CR1 | Surveys will be conducted by cultural resource specialists prior to construction to identify potential cultural resources, including cultural sites, artifacts, and Indian Trust Assets. |
| CR2 | Proposed projects will comply with applicable cultural resources regulations and acquire appropriate permits or clearance. |
| CR3 | If cultural sites or artifacts are discovered during construction, work will be stopped and a qualified archeologist will be consulted. |
| | Hazardous Materials |
| HM1 | The project site will be surveyed and tested for existing hazardous substances by qualified persons and, if present, cleaned up prior to construction. All fill material used will be checked for contaminants, and discarded material and any accidental spills will be removed and disposed of at an approved site. |
| HM2 | Chemical pesticide and fertilizer use will be consistent with environmentally beneficial objectives of the actions. |
| HM3 | A written contingency plan will be developed for all project sites where hazardous materials (e.g., pesticides, herbicides, and petroleum products) will be used or stored. Appropriate materials and supplies (e.g., shovel, disposal containers, absorbent materials, first aid supplies, and clean water) will be available on site to cleanup any small scale accidental hazardous spill. Hazardous spills will be reported to State and Federal authorities. |
| HM4 | Treatments for the control or removal of invasive plants in riparian/wetland areas must be limited to hand or wick applications by qualified personnel. |
| HM5 | Apply chemicals during calm, dry weather and maintain unsprayed buffer areas near aquatic habitats and other sensitive areas. |
| HM6 | Chemical applications must be avoided where seasonal precipitation or excess irrigation water is likely to wash residual toxic substances into waterways. |



| Code | Mitigation and Conservation Measures |
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| | Access, Roads, and Traffic |
| ART1 | Whenever possible, existing roads will be used to access project sites. Access agreements will be established with landowners as needed. Access to project sites will be clearly marked to avoid accidental trespass or damage to land cover. |
| ART2 | Limitations will be placed on frequency and total amount of construction traffic, and appropriate speed limits will be set to reduce dust hazards and potential for accidents. Vehicle and heavy equipment speed within construction area will be safely limited. |
| ART3 | Unless maintenance or monitoring access is required, only temporary roads will be constructed. Temporary roads will be built with as little damage as possible to the land cover using careful routing and proper surface materials, such as wood chips. Sensitive root zones and vegetated areas will be fenced-off from roaded areas. |
| ART4 | Temporary roads will be removed upon completion of the project and vegetation and habitats restored. |
| ART5 | Temporary roads that have been severely compacted will be tilled to promote vegetation establishment and growth. |
| ART6 | Access roads will be improved or built suitably for heavy equipment, multiple haul loads, and materials being transported. Loads will be covered, as needed, for trucks transporting material off-site. |



Appendix B. Federal special status species in the Deer Creek Action Area

December 21, 1999

LISTED SPECIES

Birds

Aleutian Canada goose, *Branta canadensis leucopareia*(T)
bald eagle, *Haliaeetus leucocephalus*(T)

Reptiles

giant garter snake, *Thamnophis gigas*(T)

Amphibians

California red-legged frog, *Rana aurora draytonii*(T)

Fish

Central Valley spring-run chinook salmon, *Oncorhynchus tshawytscha*(T)
Central Valley steelhead, *Oncorhynchus mykiss*(T)
Critical habitat, winter-run chinook salmon, *Oncorhynchus tshawytscha*(E)
Sacramento splittail, *Pogonichthys macrolepidotus*(T)
delta smelt, *Hypomesus transpacificus*(T)
winter-run chinook salmon, *Oncorhynchus tshawytscha*(E)

Invertebrates

Conservancy fairy shrimp, *Branchinecta conservatio*(E)
valley elderberry longhorn beetle, *Desmocerus californicus dimorphus*(T)
vernal pool fairy shrimp, *Branchinecta lynchi*(T)
vernal pool tadpole shrimp, *Lepidurus packardi*(E)

Plants

Butte County (Shippee) meadowfoam, *Limnanthes floccosa ssp. californica*(E)
Greene's tuctoria, *Tuctoria greenei*(E)
Hoover's spurge, *Chamaesyce hooveri*(T)
hairy Orcutt grass, *Orcuttia pilosa*(E)
slender Orcutt grass, *Orcuttia tenuis*(T)

PROPOSED SPECIES

Fish

Critical Habitat, Central Valley spring-run chinook, *Oncorhynchus tshawytscha*(PX)



CANDIDATE SPECIES

Fish

Central Valley fall/late fall-run chinook salmon, *Oncorhynchus tshawytscha*(C)

SPECIES OF CONCERN

Mammals

Marysville Heermann's kangaroo rat, *Dipodomys californicus eximius*(SC)
Pacific western big-eared bat, *Corynorhinus (=Plecotus) townsendii townsendii*(SC)
San Joaquin pocket mouse, *Perognathus inornatus*(SC)
Yuma myotis bat, *Myotis yumanensis*(SC)
fringed myotis bat, *Myotis thysanodes*(SC)
greater western mastiff-bat, *Eumops perotis californicus*(SC)
long-eared myotis bat, *Myotis evotis*(SC)
long-legged myotis bat, *Myotis volans*(SC)
pale Townsend's big-eared bat, *Corynorhinus (=Plecotus) townsendii pallescens*(SC)
small-footed myotis bat, *Myotis ciliolabrum*(SC)
spotted bat, *Euderma maculatum*(SC)

Birds

American peregrine falcon, *Falco peregrinus anatum*(D)
ferruginous hawk, *Buteo regalis*(SC)
tricolored blackbird, *Agelaius tricolor*(SC)
western burrowing owl, *Athene cucularia hypugea*(SC)
white-faced ibis, *Plegadis chihi*(SC)

Reptiles

northwestern pond turtle, *Clemmys marmorata marmorata*(SC)

Amphibians

foothill yellow-legged frog, *Rana boylei*(SC)
western spadefoot toad, *Scaphiopus hammondii*(SC)

Fish

green sturgeon, *Acipenser medirostris*(SC)
longfin smelt, *Spirinchus thaleichthys*(SC)
river lamprey, *Lampetra ayresi*(SC)

Invertebrates

Antioch Dunes anthicid beetle, *Anthicus antiochensis*(SC)
California linderiella, *Linderiella occidentalis*(SC)
Sacramento anthicid beetle, *Anthicus sacramento*(SC)



Plants

- Ahart's whitlow-wort, *Paronychia ahartii*(SC)
- Butte County sidalcea, *Sidalcea robusta*(SC)
- California beaked-rush, *Rhynchospora californica*(SC)
- adobe lily, *Fritillaria pluriflora*(SC)
- veiny monardella, *Monardella douglasii ssp. venosa*(SC)

KEY:

- (E) Endangered Listed (in the Federal Register) as being in danger of extinction.
- (T) Threatened Listed as likely to become endangered within the foreseeable future.
- (P) Proposed Officially proposed (in the Federal Register) for listing as endangered or threatened.
- (PX) Proposed Critical Habitat Proposed as an area essential to the conservation of the species.
- (C) Candidate Candidate to become a proposed species.
- (SC) Species of Concern May be endangered or threatened. Not enough biological information has been gathered to support listing at this time.
- (D) Delisted Delisted. Status to be monitored for 5 years.



October 1999

Birds

American peregrine falcon, *Falco peregrinus anatum* (E)
bald eagle, *Haliaeetus leucocephalus* (E)
Swainson's hawk, *Buteo swainsoni* (T)
Western yellow-billed cuckoo, *Coccyzus americanus occidentalis* (E)
bank swallow, *Riparia riparia* (T)

Fish

Central Valley spring-run chinook salmon, *Oncorhynchus tshawytscha* (T)
Central Valley winter-run chinook salmon, *Oncorhynchus tshawytscha* (E)
delta smelt, *Hypomesus transpacificus* (T)

Reptiles

giant garter snake, *Thamnophis gigas* (T)

Plants

hairy Orcutt grass, *Orcuttia pilosa* (E)
slender Orcutt grass, *Orcuttia tenuis* (E)

KEY:

(E) Endangered
(T) Threatened

Source: CDFG, Natural Heritage Division, Natural Diversity Data Base, October 1999 .



| ACTION | POTENTIAL EFFECTS ON RESOURCES | MITIGATION AND CONSERVATION |
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| <p>2. Fish Screens</p> | <p><u>Vegetation and Wildlife</u> Vegetation could be lost at the access points, construction sites, and staging areas. Temporary disturbance from construction noise and activities; temporary loss or degradation of habitat during construction and before habitat restoration; incidental mortality or injury.</p> <p><u>Fisheries and Water Quality</u> Risk of oil or grease discharge from equipment; temporary siltation and turbidity due to construction; dewatered habitat; temporary disturbance of aquatic habitat.</p> <p>Reduced straying and entrainment of juvenile and adult fish into water diversions</p> <p><u>Special Status Species</u> Temporary disturbance from construction noise and activities; temporary loss or degradation of habitat during construction and before habitat restoration; incidental mortality or injury.</p> <p>Reduced straying and entrainment of juvenile and adult fish into water diversions</p> <p><u>Hydrology and Stream Channel</u> Changes in channel geomorphology could lead to streambank and streambed erosion and altered sediment transport and deposition. Flood control systems could be altered.</p> <p><u>Socioeconomic Conditions</u> No effects expected.</p> <p><u>Air Quality and Noise</u> Dust and vehicle exhaust due to construction activities.</p> <p><u>Cultural Resources</u> Disturbance of exposed or buried cultural resources.</p> <p><u>Recreation</u> Recreational activities could be impeded during project construction.</p> | <p><u>Vegetation and Wildlife</u> VW1-20, HM3, ART1-6, AQN2</p> <p><u>Fisheries and Water Quality</u> FWQ1-8, HM3</p> <p><u>Special Status Species</u> SS1-14</p> <p><u>Hydrology and Stream Channel</u> HSC1-7</p> <p><u>Socioeconomic Conditions</u> n/a</p> <p><u>Air Quality and Noise</u> AQN1, AQN2</p> <p><u>Cultural Resources</u> CR1, CR2, CR3</p> <p><u>Recreation</u> R1, R2, R3</p> |



| ACTION | POTENTIAL EFFECTS ON RESOURCES | MITIGATION AND CONSERVATION |
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| 3. Fish Passage | <p><u>Vegetation and Wildlife</u> Vegetation could be lost at access points, construction sites, and staging areas. Isolation of riparian vegetation and wetlands from water supplies due to changes in hydrology. Temporary disturbance from construction noise and activities; temporary loss or degradation of habitat during construction and before habitat restoration; incidental mortality or injury.</p> <p><u>Fisheries and Water Quality</u> Risk of oil or grease discharge from equipment; temporary siltation and turbidity due to construction; temporary dewatered habitat; temporary disturbance of aquatic habitat; incidental mortality or injury.</p> <p>Improved fish migration within creek; reduced stranding and entrainment, reduced injuries during migration; reduced cold water fish mortalities from warm water temperatures and poaching.</p> <p><u>Special Status Species</u> Temporary disturbance from construction noise and activities; temporary loss or degradation of habitat during construction and before habitat restoration; incidental mortality or injury.</p> <p>Improved salmonid and splittail passage; reduced stranding and entrainment; reduced injuries mortalities from warm water temperatures and poaching.</p> <p><u>Hydrology an`d Stream Channel</u> Changes in water control structures could lead to streambank and streambed erosion, altered sediment transport and deposition, and altered channel geomorphology. Flood control systems could be altered.</p> <p><u>Socioeconomic Conditions</u> No effects expected.</p> <p><u>Air Quality and Noise</u> Dust and vehicle exhaust due to construction activities.</p> <p><u>Cultural Resources</u> Disturbance of exposed or buried cultural resources.</p> <p><u>Recreation</u> Recreational activities could be impeded during project construction.</p> | <p><u>Vegetation and Wildlife</u> VW1-20, HM3, ART1-6, AQN2</p> <p><u>Fisheries and Water Quality</u> FWQ1-8, HM3</p> <p><u>Special Status Species</u> SS1-14</p> <p><u>Hydrology and Stream Channel</u> HSC1-7</p> <p><u>Socioeconomic Conditions</u> n/a</p> <p><u>Air Quality and Noise</u> AQN1, AQN2</p> <p><u>Cultural Resources</u> CR1, CR2, CR3</p> <p><u>Recreation</u> R1, R2, R3</p> |



| ACTION | POTENTIAL EFFECTS ON RESOURCES | MITIGATION AND CONSERVATION |
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| <p>4. Spawning Gravel</p> | <p><u>Vegetation and Wildlife</u> Vegetation could be lost at the access points, construction sites, and staging areas. Temporary disturbance from construction noise and activities; temporary loss or degradation of habitat during construction and before habitat restoration; incidental mortality or injury.</p> <p><u>Fisheries and Water Quality</u> Risk of oil or grease discharge from equipment; temporary siltation and turbidity due to construction ; dewatered habitat; temporary disturbance of aquatic habitat.</p> <p>Increased quantity and quality of spawning habitat; improved hatching and rearing success; improved aquatic invertebrate production.</p> <p><u>Special Status Species</u> Temporary disturbance from construction noise and activities; temporary loss or degradation of habitat during construction and before habitat restoration; incidental mortality or injury.</p> <p>Increased quantity and quality of spawning habitat; improved hatching and rearing success; improved aquatic invertebrate production.</p> <p><u>Hydrology and Stream Channel</u> Changes in channel geomorphology could lead to streambank and streambed erosion and altered sediment transport and deposition. Flood control systems could be altered.</p> <p><u>Socioeconomic Conditions</u> No effects are expected.</p> <p><u>Air Quality and Noise</u> Dust and vehicle exhaust due to construction activities.</p> <p><u>Cultural Resources</u> Disturbance of exposed or buried cultural resources.</p> <p><u>Recreation</u> Recreational activities could be impeded during project construction.</p> | <p><u>Vegetation and Wildlife</u> VW1-13, VW16, VW18-20, HM3, ART1-6, AQN2</p> <p><u>Fisheries and Water Quality</u> FWQ1-8, HM3</p> <p><u>Special Status Species</u> SS1-14</p> <p><u>Hydrology and Stream Channel</u> HSC1-7</p> <p><u>Socioeconomic Conditions</u> n/a</p> <p><u>Air Quality and Noise</u> AQN1, AQN2</p> <p><u>Cultural Resources</u> CR1, CR2, CR3</p> <p><u>Recreation</u> R1, R2</p> |



| ACTION | POTENTIAL EFFECTS ON RESOURCES | MITIGATION AND CONSERVATION |
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| <p>5. Channel and Instream Habitat Modification</p> | <p><u>Vegetation and Wildlife</u> Vegetation could be lost at the access points, construction sites, and staging areas. Temporary disturbance from construction noise and activities; temporary loss or degradation of habitat during construction and before habitat restoration; incidental mortality or injury.</p> <p><u>Fisheries and Water Quality</u> Risk of oil or grease discharge from equipment; temporary siltation and turbidity due to construction ; dewatered habitat; temporary disturbance of aquatic habitat.</p> <p><u>Special Status Species</u> Temporary disturbance from construction noise and activities; temporary loss or degradation of habitat during construction and before habitat restoration; incidental mortality or injury.</p> <p><u>Hydrology and Stream Channel</u> Changes in channel geomorphology could lead to streambank and streambed erosion and altered sediment transport and deposition. Flood control systems could be altered.</p> <p><u>Socioeconomic Conditions</u> No adverse effects are expected.</p> <p><u>Air Quality and Noise</u> Dust and vehicle exhaust due to construction activities.</p> <p><u>Cultural Resources</u> Disturbance of exposed or buried cultural resources.</p> <p><u>Recreation</u> Recreational activities could be impeded during project construction.</p> | <p><u>Vegetation and Wildlife</u> VW1-13, VW16, VW18-20, HM3, ART1-6, AQN2</p> <p><u>Fisheries and Water Quality</u> FWQ1-8, HM3</p> <p><u>Special Status Species</u> SS1-14</p> <p><u>Hydrology and Stream Channel</u> HSC1-7</p> <p><u>Socioeconomic Conditions</u> n/a</p> <p><u>Air Quality and Noise</u> AQN1, AQN2</p> <p><u>Cultural Resources</u> CR1, CR2, CR3</p> <p><u>Recreation</u> R1, R2</p> |



| ACTION | POTENTIAL EFFECTS ON RESOURCES | MITIGATION AND CONSERVATION |
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| <p>6. Streambank Modification</p> | <p><u>Vegetation and Wildlife</u> Loss of vegetation from equipment use and earth disturbing activities; loss of vegetation from streambank erosion during and after land recontouring; injury to native vegetation during exotic vegetation removal. Temporary disturbance from construction noise and activities; temporary loss or degradation of habitat during construction and before habitat restoration; incidental mortality or injury.</p> <p>Improved substrates for riparian vegetation growth.</p> <p><u>Fisheries and Water Quality</u> Temporary siltation and turbidity due to construction on streambanks or in stream channels.</p> <p>Reduced erosion; enhanced near-shore cover for fish and other aquatic species</p> <p><u>Special Status Species</u> Temporary disturbance from construction noise and activities; temporary loss or degradation of habitat during construction and before habitat restoration; incidental mortality or injury.</p> <p>Benefits are similar to those in Vegetation and Wildlife and Fisheries and Water Quality, and includes enhancement of special status species habitats.</p> <p><u>Hydrology and Stream Channel</u> Changes in streambank geomorphology could lead to streambank and streambed erosion and altered sediment transport and deposition.</p> <p>Streambank and streambed should be more stable in problematic areas.</p> <p><u>Socioeconomic Conditions</u> Temporary or minor loss of agricultural productivity due to construction. Growth of noxious weeds is possible on revegetated action sites.</p> <p><u>Air Quality and Noise</u> Dust and vehicle exhaust due to construction activities.</p> <p><u>Cultural Resources</u> Disturbance of exposed or buried cultural resources.</p> <p><u>Recreation</u> Recreational activities could be impeded during project construction.</p> | <p><u>Vegetation and Wildlife</u> VW1-20, HM1-6, ART1-6, AQN2</p> <p><u>Fisheries and Water Quality</u> FWQ1-8, HM3</p> <p><u>Special Status Species</u> SS1-14</p> <p><u>Hydrology and Stream Channel</u> HSC1-4, HSC6, HSC7</p> <p><u>Socioeconomic Conditions</u> SC1, SC2, SC3, SC4, SC5</p> <p><u>Air Quality and Noise</u> AQN1, AQN2</p> <p><u>Cultural Resources</u> CR1, CR2, CR3</p> <p><u>Recreation</u> VW11, R1, R2</p> |



| ACTION | POTENTIAL EFFECTS ON RESOURCES | MITIGATION AND CONSERVATION |
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| <p>7. Riparian Revegetation</p> | <p><u>Vegetation and Wildlife</u> Loss of vegetation from equipment use and earth disturbing activities; loss of vegetation from streambank erosion during and after land recontouring; injury to native vegetation during exotic vegetation removal. Temporary disturbance from construction noise and activities; temporary loss or degradation of habitat during construction and before habitat restoration; incidental mortality or injury.</p> <p>Increased riparian habitat area and quality; improved shade and cover for fish and wildlife; enhanced nutrient cycling and invertebrate production; stabilized banks; improved dispersion and migration pathways; reduced water velocities.</p> <p><u>Fisheries and Water Quality</u> Temporary siltation and turbidity due to construction on streambanks or in stream channels.</p> <p>Reduced sedimentation in creek; increase SRA habitat; reduced aquatic temperature; buffer impacts from adjacent uplands.</p> <p><u>Special Status Species</u> Temporary disturbance from construction noise and activities; temporary loss or degradation of habitat during construction and before habitat restoration; incidental mortality or injury.</p> <p>Benefits are similar to those in Vegetation and Wildlife and Fisheries and Water Quality, and includes enhancement of special status species habitats.</p> <p><u>Hydrology and Stream Channel</u> Riparian vegetation in floodplain could increase.</p> <p><u>Socioeconomic Conditions</u> Loss of agricultural productivity due to dedication of agricultural land to riparian habitat. Growth of noxious weeds is possible on revegetated action sites.</p> <p><u>Air Quality and Noise</u> Dust and vehicle exhaust due to construction activities.</p> <p><u>Cultural Resources</u> Disturbance of exposed or buried cultural resources.</p> <p><u>Recreation</u> Recreational activities could be impeded during project construction. However, the long term effect would increase visual aesthetics and shade.</p> | <p><u>Vegetation and Wildlife</u> VW1-20, HM1-6, ART1-6, AQN2</p> <p><u>Fisheries and Water Quality</u> FWQ7, HM2-6</p> <p><u>Special Status Species</u> SS1-14</p> <p><u>Hydrology and Stream Channel</u> HSC1-7</p> <p><u>Socioeconomic Conditions</u> SC1, SC2, SC3, SC4, SC5</p> <p><u>Air Quality and Noise</u> AQN1, AQN2</p> <p><u>Cultural Resources</u> CR1, CR2, CR3</p> <p><u>Recreation</u> VW11, R1, R2</p> |



| ACTION | POTENTIAL EFFECTS ON RESOURCES | MITIGATION AND CONSERVATION |
|--|---|--|
| <p>8. Meander Belt and Floodplain Management</p> | <p><u>Vegetation and Wildlife</u> Loss of vegetation from equipment use and earth disturbing activities; loss of vegetation from stream bank erosion during and after land recontouring; injury to native vegetation during exotic vegetation removal. Temporary disturbance from construction noise and activities; temporary loss or degradation of habitat during construction and before habitat restoration; incidental mortality or injury.</p> <p><u>Fisheries and Water Quality</u> Temporary siltation and turbidity due to revegetation activities on or near streambanks and stream channels.</p> <p><u>Special Status Species</u> Temporary disturbance from construction noise and activities; temporary loss or degradation of habitat during construction and before habitat restoration; incidental mortality or injury.</p> <p><u>Hydrology and Stream Channel</u> Changes in channel geomorphology could lead to streambank and streambed erosion and altered sediment transport and deposition. Riparian vegetation in floodplain could increase. Flood control systems could be altered.</p> <p><u>Socioeconomic Conditions</u> Loss of agricultural productivity due to dedication of agricultural land to flooding or establishment of riparian habitat. Growth of noxious weeds is possible on revegetated action sites.</p> <p><u>Air Quality and Noise</u> Dust and vehicle exhaust due to construction activities.</p> <p><u>Cultural Resources</u> Disturbance of exposed or buried cultural resources.</p> <p><u>Recreation</u> Recreational activities could be impeded during project construction.</p> | <p><u>Vegetation and Wildlife</u> VW1-20, HM1-6, ART1-6, AQN2</p> <p><u>Fisheries and Water Quality</u> FWQ1, FWQ2, FWQ4-7, HM2-6</p> <p><u>Special Status Species</u> SS1-14</p> <p><u>Hydrology and Stream Channel</u> HSC1-7</p> <p><u>Socioeconomic Conditions</u> SC1, SC2, SC3, SC4, SC5</p> <p><u>Air Quality and Noise</u> AQN1, AQN2</p> <p><u>Cultural Resources</u> CR1, CR2, CR3</p> <p><u>Recreation</u> R1, R2, R3</p> |



| ACTION | POTENTIAL EFFECTS ON RESOURCES | MITIGATION AND CONSERVATION MEASURES |
|-----------------------------------|--|---|
| <p>9. Agricultural Management</p> | <p><u>Vegetation and Wildlife</u> Temporary disturbance due to management activities.</p> <p>Protection of existing habitats; removal of known risks; prevention of future risks; prevention of grazing impacts on riparian vegetation.</p> <p><u>Fisheries and Water Quality</u> Temporary siltation and turbidity due to management activities.</p> <p>Protected and enhanced aquatic ecosystem through reductions in pesticide, herbicide, and chemical use; reduced damage to riparian zones from agricultural practices; reduced sedimentation; prevention of widening and aggrading creek channels; reduced livestock wastes into creek.</p> <p><u>Special Status Species</u> Temporary disturbance due to management activities.</p> <p>Benefits are similar to those in Vegetation and Wildlife and Fisheries and Water Quality, and includes enhancement of special status species habitats.</p> <p><u>Hydrology and Stream Channel</u> Temporary disturbance due to management activities.</p> <p><u>Socioeconomic Conditions</u> Temporary or minor loss of agricultural productivity due to management activities or dedication of agricultural land to habitat management. Growth of noxious weeds is possible on revegetated action sites.</p> <p><u>Air Quality and Noise</u> Dust and vehicle exhaust due to management activities.</p> <p><u>Cultural Resources</u> Disturbance of exposed or buried cultural resources</p> <p><u>Recreation</u> Recreational activities could be impeded due to management activities.</p> | <p><u>Vegetation and Wildlife</u> VW1-7, VW9-14, ART1, AQN2</p> <p><u>Fisheries and Water Quality</u> FWQ4, FWQ5, FWQ7</p> <p><u>Special Status Species</u> SS1-14</p> <p><u>Hydrology and Stream Channel</u> HSC2</p> <p><u>Socioeconomic Conditions</u> SC1, SC2, SC3, SC4, SC5</p> <p><u>Air Quality and Noise</u> AQN1, AQN2</p> <p><u>Cultural Resources</u> CR1, CR2, CR3</p> <p><u>Recreation</u> R1, R2</p> |



| ACTION | POTENTIAL EFFECTS ON RESOURCES | MITIGATION AND CONSERVATION MEASURES |
|----------------------------|---|--|
| <p>10. Road Management</p> | <p><u>Vegetation and Wildlife</u> Impacts to vegetation from construction equipment and earth-disturbing activities; vegetation loss from temporary streambank erosion. Temporary disturbance from construction noise and activities; temporary loss or degradation of habitat during construction and before habitat restoration; incidental mortality or injury.</p> <p><u>Fisheries and Water Quality</u> Temporary siltation and turbidity due to construction near stream channels or at road crossings. Long term effects should be reduced erosion and sedimentation.</p> <p><u>Special Status Species</u> Temporary disturbance from construction noise and activities; temporary loss or degradation of habitat during construction and before habitat restoration; incidental mortality or injury.</p> <p>Protection of anadromous salmonid spawning habitats from excessive sedimentation and degradation.</p> <p><u>Hydrology and Stream Channel</u> Stream channel could be damaged at road crossings. However, stream channel would be prevented from excessive erosion in problematic areas.</p> <p><u>Socioeconomic Conditions</u> Growth of noxious weeds is possible on revegetated action sites.</p> <p><u>Air Quality and Noise</u> Dust and vehicle exhaust due to construction activities.</p> <p><u>Cultural Resources</u> Disturbance of exposed or buried cultural resources.</p> <p><u>Recreation</u> Recreational activities could be impeded during project construction.</p> | <p><u>Vegetation and Wildlife</u> VW1-20, HM1, HM3, ART1, ART2, AQN2</p> <p><u>Fisheries and Water Quality</u> FWQ1-8</p> <p><u>Special Status Species</u> SS1-14</p> <p><u>Hydrology and Stream Channel</u> HSC1-4, HSC6, HSC7</p> <p><u>Socioeconomic Conditions</u> SC5</p> <p><u>Air Quality and Noise</u> AQN1, AQN2</p> <p><u>Cultural Resources</u> CR1, CR2, CR3</p> <p><u>Recreation</u> R1, R2</p> |



| ACTION | POTENTIAL EFFECTS ON RESOURCES | MITIGATION AND CONSERVATION MEASURES |
|----------------|---|--|
| 11. Monitoring | <p><u>Vegetation and Wildlife</u> Temporary disturbance due to monitoring activities. Data would be acquired to improve vegetation and wildlife management.</p> <p><u>Fisheries and Water Quality</u> Temporary increases in sedimentation and turbidity due to monitoring activities. Data would be acquired to improve fishery and water quality management.</p> <p><u>Special Status Species</u> Temporary disturbance of special-status species and their habitats due to monitoring activities. Data would be acquired to improve management of special status species.</p> <p><u>Hydrology and Stream Channel</u> Data would be acquired to improve hydrology and stream channel management.</p> <p><u>Socioeconomic Conditions</u> No effects are expected.</p> <p><u>Air Quality and Noise</u> Dust and vehicle exhaust due to monitoring activities.</p> <p><u>Cultural Resources</u> Disturbance of exposed or buried cultural resources.</p> <p><u>Recreation</u> Recreational activities could be impeded during monitoring activities.</p> | <p><u>Vegetation and Wildlife</u> VW1, VW3, VW9, VW10, VW18, AQN2</p> <p><u>Fisheries and Water Quality</u> FWQ1, FWQ4, FWQ9</p> <p><u>Special Status Species</u> SS1-14</p> <p><u>Hydrology and Stream Channel</u> n/a</p> <p><u>Socioeconomic Conditions</u> n/a</p> <p><u>Air Quality and Noise</u> AQN1, AQN2</p> <p><u>Cultural Resources</u> CR1, CR2, CR3</p> <p><u>Recreation</u> R1, R2</p> |



Appendix E.

Common and scientific names of species listed in the text

Plants

| | |
|--------------------------|--|
| box elder | <i>Acer negundo californica</i> |
| chamise | <i>Adenostoma fasciculatum</i> |
| manzanita | <i>Arctostaphylos spp.</i> |
| Dutchman's pipe vine | <i>Aristolochia californica</i> |
| mugwort | <i>Artemisia douglasiana</i> |
| giant reed | <i>Arundo donax</i> |
| wild oat | <i>Avena fatua</i> |
| mule fat | <i>Baccharis salicifolia</i> |
| red brome | <i>Bromus madritensis ssp. rubens</i> |
| ripgut brome | <i>Bromus diandrus</i> |
| sedges | <i>Carex spp.</i> |
| buck brush | <i>Ceanothus cuneatus</i> |
| yellow-star thistle | <i>Centaurea solstitialis</i> |
| California button-willow | <i>Cephalanthus occidentalis californicus</i> |
| California redbud | <i>Cercis occidentalis</i> |
| Hoover's spurge | <i>Chamaesyce hooveri</i> (T) |
| poison hemlock | <i>Conium maculatum</i> |
| rye-grasses | <i>Elymus cinereus</i> |
| turkey mullein | <i>Eremocarpus seterigus</i> |
| yerba santa | <i>Eriodictyon californicum</i> |
| long-beaked filaree | <i>Erodium botrys</i> |
| redstem filaree | <i>Erodium cicutarium</i> |
| California poppy | <i>Eschscholzia californica</i> |
| edible fig | <i>Ficus carica</i> |
| California flannel bush | <i>Fremontodendron californicum</i> |
| adobe lily | <i>Fritillaria pluriflora</i> (SC) |
| toyon | <i>Heteromeles arbutifolia</i> |
| rose-mallow | <i>Hibiscus lasiocarpus</i> |
| wild barley | <i>Hordeum spp.</i> |
| California black walnut | <i>Juglans californica</i> var. <i>hindsii</i> |
| rushes | <i>Juncus spp.</i> |
| duckweed | <i>Lemna aequinoctialis</i> |
| Mariposa lilies | <i>Lilium spp.</i> |
| Italian ryegrass | <i>Lolium multiflorum</i> |
| hairy Orcutt grass | <i>Orcuttia pilosa</i> (E) |
| slender Orcutt grass | <i>Orcuttia tenuis</i> (T) |
| Ahart's whitlow-wort | <i>Paronychia ahartii</i> (SC) |
| gray pine | <i>Pinus sabiniana</i> |
| popcornflowers | <i>Plagiobothrys spp.</i> |
| western sycamore | <i>Platanus racemosa</i> |
| Fremont cottonwood | <i>Populus fremontii</i> |
| pondweeds | <i>Potamogeton spp.</i> |
| blue oak | <i>Quercus douglasii</i> |



scrub oak
valley oak
interior live oak
coffeeberry
Himalaya-berry
California blackberry
valley sagittaria
red willow
sandbar willow
blue elderberry
Johnson grass
medusa head
poison oak
clovers
Greene's tuctoria
California wild grape
slender fescue

Quercus berberidifolia
Quercus lobata
Quercus wislizenii
Rhamnus tomentella
Rubus discolor
Rubus ursinus
Sagittaria sanfordii (SC)
Salix laevigata
Salix sessilifolia
Samubus mexicana
Sorghum halepense
Taeniatherum caput-medusae
Toxicodendron diversilobum
Trifolium spp.
Tuctoria greenei (E)
Vitis californica
Vulpia bromoides

Fish

brown trout
California roach
hardhead
speckled dace
green sturgeon
white catfish
Sacramento sucker
common carp
delta smelt
tule perch
bluegill
green sunfish
small mouth bass
largemouth bass
rainbow trout
Central Valley steelhead
Central Valley fall-run chinook salmon
Central Valley spring-run chinook salmon
winter-run chinook salmon
Sacramento splittail
Sacramento pikeminnow
longfin smelt

Salmo trutta
Hesperoleucus symmetricus
Myopharodon conocephalus
Rhinichthys osculus
Acipenser medirostris (SC)
Ameiurus catus
Catostomus occidentalis
Cyprinus carpio
Hypomesus transpacificus (T)
Hysterocarpus traski
Lepomis macrochirus
Lepomis cyanellus
Micropterus dolomieu
Micropterus salmoides
Oncorhynchus mykiss
Oncorhynchus mykiss (T)
Oncorhynchus tshawytscha (C)
Oncorhynchus tshawytscha (T)
Oncorhynchus tshawytscha (E)
Pogonichthys macrolepidotus (T)
Ptychocheilus grandis
Spirinchus thaleichthys (SC)



Reptiles

northwestern pond turtle
giant garter snake

Clemmys marmorata marmorata (SC)
Thamnophis gigas (T)

Amphibians

foothill yellow-legged frog
western spadefoot toad
California red-legged frog

Rana boylei(SC)
Scaphiopus hammondii (SC)
Rana aurora draytonii (T)

Invertebrates

Antioch Dunes anthicid beetle
Sacramento anthicid beetle
conservancy fairy shrimp
valley elderberry longhorn beetle
vernal pool fairy shrimp
vernal pool tadpole shrimp

Anthicus antiochensis (SC)
Anthicus sacramento (SC)
Branchinecta conservatio (E)
Desmocerus californicus dimorphus (T)
Branchinecta lynchi (T)
Lepidurus packardi (E)

Birds

wood duck
cinnamon teal
gadwall
mallard
western burrowing owl
Aleutian Canada goose
Canada goose
great horned owl
ferruginous hawk
red-shouldered hawk
Swainson's hawk
California quail
Western yellow-billed cuckoo
American peregrine falcon
bald eagle
common merganser
osprey
white-faced ibis
bank swallow
warbling vireo
Wilson's warbler
mourning dove

Aix sponsa
Anas cyanoptera
Anas strepera
Anas platyrhynchos
Athene cunicularia hypugea (SC)
Branta canadensis leucopareia (T)
Branta canadensis
Bubo virginianus
Buteo regalis (SC)
Buteo lineatus
Buteo swainsoni (T)
Callipepla californica
Coccyzus americanus occidentalis (E)
Falco peregrinus anatum (SC)
Haliaeetus leucocephalus (T)
Mergus merganser
Pandion haliaetus
Plegadis chihi (SC)
Riparia riparia (T)
Vireo gilvus
Wilsonia pusilla
Zenaida macroura



Mammals

| | |
|-------------------------------|--|
| ringtail | <i>Bassariscus astutus</i> |
| beaver | <i>Castor canadensis</i> |
| Virginia opossum | <i>Didelphis virginiana</i> |
| spotted bat | <i>Euderma maculatum</i> (SC) |
| river otter | <i>Lutra canadensis</i> |
| striped skunk | <i>Mephitis mephitis</i> |
| fringed myotis bat | <i>Myotis thysanodes</i> (SC) |
| long-eared myotis bat | <i>Myotis evotis</i> (SC) |
| long-legged myotis bat | <i>Myotis volans</i> (SC) |
| small-footed myotis bat | <i>Myotis ciliolabrum</i> (SC) |
| Yuma myotis bat | <i>Myotis yumanensis</i> (SC) |
| mule deer | <i>Odocoileus hemionus</i> |
| San Joaquin pocket mouse | <i>Perognathus inornatus</i> (SC) |
| Pacific western big-eared bat | <i>Plecotus townsendii townsendii</i> (SC) |
| pale Townsend's big-eared bat | <i>Plecotus townsendii pallescens</i> (SC) |
| raccoon | <i>Procyon lotor</i> |
| western gray squirrel | <i>Sciurus griseus</i> |

