Final Environmental Assessment/Initial Study
Proposed Finding of No Significant Impact/Negative Declaration

for the

Conveyance of Refuge Water Supply Project East Sacramento Valley Study Area

December 1997

U.S. Department of the Interior

U.S. Bureau of Reclamation

California Department of Fish and Game

2346_03

CONVEYANCE OF REFUGE WATER SUPPLY ENVIRONMENTAL ASSESSMENT AND INITIAL STUDY

EAST SACRAMENTO VALLEY STUDY AREA

Sutter National Wildlife Refuge
Gray Lodge Wildlife Area

Lead Agencies:
U.S. Department of Interior -
Bureau of Reclamation
California Department of Fish and Game

FINAL

December 1997

United States Department of the Interior

Bureau of Reclamation
Mid-Pacific Region
Sacramento, California

FINDING OF NO SIGNIFICANT IMPACT

CONVEYANCE OF REFUGE WATER SUPPLY
EAST SACRAMENTO VALLEY STUDY AREA

Recommended: _____ Chief, Division of Planning _____ Date

Concur: _____ Regional Environmental Officer _____ Date

Approved: _____ Regional Director _____ Date

Finding of No Significant Impact

Conveyance of Refuge Water Supply
East Sacramento Valley Study Area

Lead Agency:

U.S. Bureau of Reclamation
2800 Cottage Way
Sacramento, California 95825

In accordance with the National Environmental Policy Act of 1969 (NEPA), as amended, and the Council on Environmental Quality's Regulations for Implementing the Procedural Provisions of NEPA (40 CFR Parts 1500-1508), the Mid-Pacific Regional Office of the U.S. Bureau of Reclamation has determined that the proposed actions would not significantly affect the quality of the environment. Therefore, an Environmental Impact Statement is not required for the conveyance of refuge water supply to the East Sacramento Valley. Implementation of the preferred alternatives may take place immediately.

Background

The U.S. Bureau of Reclamation (Reclamation), in cooperation with the U.S. Fish and Wildlife (Service), and the California Department of Fish and Game (Department), proposes to construct and/or improve existing conveyance facilities for water supplies to Sutter National Wildlife Refuge and Gray Lodge Wildlife Area within the East Sacramento Valley area of the Central Valley. These facilities would convey firm, average annual historical water deliveries (Level 2) in addition to incremental water supplies required for optimal wildlife management (Level 4). The water deliveries would be conveyed from Central Valley Project (CVP) or State Water Project facilities to the boundary of each refuge, as specified in Section 3406 (d)(5) of the Central Valley Project Improvement Act (CVPIA), Public Law 102-575, Title XXIV, enacted October 1992.

Alternative conveyance methods were identified for each of the two refuge areas within the East Sacramento Valley, including the No-Action Alternative. Conveyance facilities include existing canals and conveyance facilities, in addition to new canals and pipelines. Each alternative was addressed in an equal level of detail and a proposed action was selected for each of the refuge areas. The identification and evaluation of alternatives was performed through the feasibility study and public meeting process. The surveying alternatives are presented in the April 1995 *Decision Document Report of Recommended Alternatives Refuge Water Supply and San Joaquin Basin Action Plan Lands* (Decision Document). Additionally, Reclamation and Service further refined the alternatives selected in the Decision Document in a May 1995 document entitled *Refuge Water Supply Conveyance Alternatives Refinement Memorandum* (Memorandum).

Proposed Actions

The following are the proposed actions for each of the refuge areas:

1. Sutter National Wildlife Refuge–Alternative SUT-10. Use existing Sutter Extension Water District canals, enlarge Farrington Lateral; modify existing siphons.

2. Gray Lodge Wildlife Area–Alternatives GRA-9 (Use existing Biggs-West Gridley facilities with improvements) and GRA-14 (Use existing Butte Water District facilities with improvements) were determined to be suitable and capable of cost-effective water delivery.

The No-Action Alternative was not selected because it would not comply with Section 3406 (d)(5) of the CVPIA which specifies increasing water supplies to each of the refuges list above. Level 4 supplies will be made available in 10 percent increments and provided in full by the year 2002.

Environmental Impacts

Implementation of the proposed action is anticipated to result in the following beneficial impacts:

1. Increased on-refuge habitat maintenance and enhancement opportunities.

2. Greater flexibility in managing flood-up schedules and decreasing the potential for disease outbreaks; such as botulism.

Reclamation prepared a draft Environmental Assessment (EA) in March 1997, which analyzed the impacts from the alternatives; a final EA was prepared in October 31, 1997. Following are the reasons, discussed in detail in the EA, why the impacts of the proposed actions are not significant:

1. Impacts to land use will be less than significant because short-term and long-term impacts to agricultural lands will be directly negotiated between Reclamation and the affected property owner/operator.

2. No impacts to wildlife and vegetation are expected because the following measures will be implemented.

   - Preconstruction surveys will be conducted to confirm the presence/absence of special-status plant species. Disturbed habitat will be restored at a 2:1 replacement ratio and the success will be ensured through monitoring.

   - No grading, excavating, or filling will take place within 30 feet of giant garter snake (GGS) habitat between November 1 and May 1. Impacts to individual snakes, if present during the allowable construction period, will be minimized through onsite monitoring by a trained monitor.

   - Preconstruction surveys will be conducted for Swainson's hawk in accordance with Department protocol and impacts will be mitigated if raptors are found to be present.

- Impacts to the Valley Elderberry Longhorn Beetle (VELB) will be minimized and shrub replanted with stems greater than 1.0 inch in diameter in accordance with the service guidelines, *Mitigation Guidelines for the Valley Elderberry Longhorn Beetle.*

- Impacts to wetlands will be minimized and replaced at a ratio of 2:1 if avoidance is not possible and success ensured through monitoring.

3. No impacts to hydrology/ water quality are expected because instream construction will be conducted to limit turbidity levels to no greater than 20 percent over background levels, or as specified by the Central Valley Regional Water Quality Control Board. Also, an Erosion Control and Sedimentation Plan will be developed and implemented.

4. No impacts to cultural resources are anticipated. In the event of encountering previously unidentified cultural materials or human remains, a qualified archaeologist will be notified.

Finding

Reclamation has determined that implementation of the preferred alternatives would not have significant adverse impacts on the quality of the human environment. This determination is based on analysis of environmental impacts using the best available information, through review of the comments received on the draft EA, Endangered Species Act Section 7 consultation, coordination concerning Indian Trust Assets and environmental justice implications, and the environmental commitments listed in the final EA. The proposed actions would provide delivery infrastructure to transport Level 4 water supplies to the Sutter National Wildlife Refuge and Gray Lodge Wildlife Area.

Negative Declaration for the Proposed

Conveyance of Refuge Water Supply East Sacramento Valley Study Area

Lead Agency:

California Department of Fish and Game
1416 Ninth Street
Sacramento, California 95814

Project Description and Alternatives

The U.S. Bureau of Reclamation (Reclamation), in cooperation with the U.S. Fish and Wildlife Service (Service) and the California Department of Fish and Game (Department), proposes to construct and/or improve existing conveyance facilities for water supplies to the Sutter National Wildlife Refuge and the Gray Lodge Wildlife Area within the East Sacramento Valley area of the Central Valley. These facilities would convey firm, average annual historical water deliveries (Level 2) in addition to incremental amount of water supplies required for optimal wildlife management (Level 4). The water deliveries would be conveyed from Central Valley Project (CVP) or State Water Project facilities to the boundary of each refuge, as specified in Section 3406 (d)(5) of the Central Valley Project Improvement Act (CVPIA).

Alternatives conveyance methods were identified for each of the two refuge areas within the East Sacramento Valley, including the No Action Alternative. Conveyance facilities include existing canals and conveyance facilities, in addition to new canals and pipelines. Following identification and evaluation the alternatives, a recommended alternative was selected for each of the refuge areas. The identification and evaluation of alternatives were performed through the feasibility study and public meetings process. The surviving alternatives are presented in the April 1995 *Decision Document Report of Recommended Alternatives Refuge Water Supply and San Joaquin Basin Action Plan Lands* (Decision Document). Additionally, Reclamation and Service further refined the alternatives selected in the Decision Document in a May 1995 document entitled *Refuge Water Supply Conveyance Alternatives Refinement Memorandum* (Memorandum).

The following alternatives were recommended for the refuge areas:

1. **Sutter National Wildlife Refuge**–Alternative SUT-10. Use existing Sutter Extension Water District canals, enlarge Farrington Lateral, modify existing siphons.

2. **Gray Lodge Wildlife Area**–Alternatives GRA-9 (Use existing Biggs-West Gridley facilities with improvements) and GRA-14 (Use existing Butte Water District facilities with improvements) were determined to be equally capable of cost-effective water delivery.

The No-Action Alternative was not selected because it would not comply with Section 3406(d)(5) of the CVPIA which specifies increasing water supplies to each of the refuges listed above.

Project Location

The project area incorporates a number of corridors adjacent to the Sutter National Wildlife Refuge and the Gray Lodge Wildlife Area within Butte, Yuba, and Sutter counties in the East Sacramento Valley.

Finding

Implementation of the proposed project is anticipated to result in the following environmental and socioeconomic effects:

- Beneficial impact in terms of increasing on-refuge habitat maintenance and enhancement opportunities
- Beneficial impact in terms of allowing for greater flexibility in managing flood-up schedules and decreasing the potential for disease outbreaks, such as botulism
- Short-term potential impacts to the habitat of the following federal and/or state listed species:
  - giant garter snake (GGS)
  - valley elderberry longhorn beetle (VELB)
  - Swainson's hawk
- Short-term impacts to vegetation and wildlife habitat including wetlands, water quality, and cultural resources

Mitigation Measures

The following mitigation measures have been identified to reduce impacts to a less than significant level. A more detailed list is included in the initial study prepared for the project.

Land Use

Short-term and long-term impacts to agricultural lands will be directly negotiated between Reclamation and the affected property owner/operator.

Wildlife and Vegetation

- Conduct preconstruction surveys to confirm the presence/absence of special-status plant species.
- Restore disturbed riparian habitat at a 2:1 replacement ratio and ensure success through monitoring.

- Do not conduct grading, excavating, or filling within 30 feet of GGS habitat between November 1 and May 1. Impacts to individual snakes, if present during the allowable construction period, will be minimized through onsite monitoring by a trained monitor.

- Conduct preconstruction surveys for Swainson's hawks in accordance with Department protocol and mitigate impacts if raptors are present.

- Minimize impacts to VELB and replant shrubs with stems greater than 1.0 inch in diameter in accordance with Services *General Compensation Guidelines for the Valley Elderberry Longhorn Beetle.*

- Minimize impacts to wetlands and replace at a 2:1 ratio if avoidance is not possible and ensure success through monitoring.

Hydrology/Water Quality

- Conduct instream construction to limit turbidity levels to no greater than 20 percent over background levels, or as specified by the Central Valley Regional Water Quality Control Board.

- Develop and implement an Erosion Control and Sedimentation Plan.

Cultural Resources

- Notify a qualified archaeologist if any previously unidentified cultural materials or human remains are discovered during construction.

As indicated above, and as further detailed in the attached Environmental Assessment/ Initial Study, the Department has determined that the proposed project will not have any significant adverse environmental effects.

Determination

On the basis of this evaluation:

a. The project will not have the potential to degrade the quality of the environment, substantially reduce the habitat of a fish and wildlife species, cause a fish and wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, reduce the number or restrict the range of a rare and endangered plant or animal, or eliminate important examples of the major periods of California history or prehistory.

b. The project will not have the potential to achieve short-term goals to the disadvantage of long-term environmental goals.

c. The project will not have effects that are individually limited, but cumulatively considerable.

d. The project will not have environmental effects that will cause substantial adverse effects on human beings, either directly or indirectly.

No substantial evidence exists that the project will have a negative effect on the environment.

This Negative Declaration is filed pursuant to the California Environmental Quality Act Guidelines. Comments may be submitted to the Department at the address identified above.

Chief, Environmental Services Division

Date

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List of Acronyms and Abbreviations

ac-ft	acre-feet
ACHP	Advisory Council on Historic Preservation
APEE	area of potential environmental effect
BWD	Butte Water District
BWGWD	Biggs-West Gridley Water District
CARB	California Air Resources Board
CEQ	Council on Environmental Quality
CEQA	California Environmental Quality Act
cfs	cubic feet per second
CMP	corrugated metal pipe
CNPS	California Native Plant Society
CO	carbon monoxide
COA	Coordinated Operations Agreement
COE	U.S. Army Corps of Engineers
CVP	Central Valley Project
CVPIA	Central Valley Project Improvement Act
CVPTM	Central Valley Production and Transfer Model
Department	California Department of Fish and Game
DWR	Department of Water Resources
EA/IS	Environmental Assessment/Initial Study
EPA	Environmental Protection Agency
ESA	Endangered Species Act of 1973
FWCA	Fish and Wildlife Coordination Act
GGS	giant garter snake
ITA	Indian Trust Assets
NDDB	Natural Diversity Database
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NO_2	nitrogen dioxide
NPDES	National Pollutant Discharge Elimination System
NRHP	National Register of Historic Places
NWA	National Wildlife Area
NWR	National Wildlife Refuge
O&M	operations and maintenance
OSHA	Occupational Safety and Health Administration
PEIS	Programmatic Environmental Impact Statement
PG&E	Pacific Gas & Electric Company
PM10	particulate matter less than 10 microns
RD	Reclamation District
Reclamation	U.S. Bureau of Reclamation
Service	U.S. Fish and Wildlife Service
SEWD	Sutter Extension Water District
SHPO	State Historic Preservation Office
SMAQMD	Sacramento Metropolitan Air Quality Management District
SO_2	sulfur dioxide
SVAB	Sacramento Valley Air Basin

SWP	State Water Project
USGS	U.S. Geological Survey
VELB	valley elderberry longhorn beetle
WA	Wildlife Area

Chapter I
Introduction and Statement of Purpose and Need

Introduction

The Conveyance of Refuge Water Supply Project was implemented pursuant to Section 3406 (d)(5) of the Central Valley Project Improvement Act (CVPIA).[1] This document was developed to meet the requirements of the National Environmental Policy Act (NEPA) and California Environmental Quality Act (CEQA). The Bureau of Reclamation (Reclamation) is acting as the lead federal agency for NEPA, on behalf of the Department of Interior (Interior), in cooperation with the U.S. Fish and Wildlife Service (Service), and the California Department of Fish and Game (Department). The Department is acting as the lead state agency for CEQA. The purpose of this document is to evaluate the environmental impacts of implementing alternative means of conveying water supplies to the Sutter National Wildlife Refuge and the Gray Lodge Wildlife Area within the East Sacramento Valley area of the Central Valley. Figure I-1 shows the location of the refuge areas identified in the CVPIA.

The environmental compliance portion of the action began with the 1995 publication of the *Refuge Report of Recommended Alternatives, Refuge Water Supply and San Joaquin Basin Action Plan Lands (Decision Document)*. This document describes all alternatives identified during technical investigations and public involvement meetings in 1994. The *Decision Document* also discusses the initial screening of the alternatives, based on environmental, technical, and economic factors as a result of project scoping/screening efforts. The potential feasibility of alternatives identified in the *Decision Document* was verified in June 1995 through public involvement workshops, stakeholder meetings, and field investigations.

This Environmental Assessment/Initial Study (EA/IS) identifies the potential environmental impacts (both beneficial and adverse) that are associated with developing conveyance facilities for firm, historical average annual water deliveries (Level 2) in addition to incremental amounts of water required for optimal wildlife management (Level 4) from the Central Valley Project (CVP) or State Water Project (SWP) facilities to the boundary of each refuge.[2] As other federal actions are proposed for implementation of the CVPIA related to the acquisition of water supplies, NEPA, CEQA, Endangered Species Act (ESA), and Fish and Wildlife Coordination Act (FWCA) compliance will be completed through separate documentation. Reclamation is currently preparing a programmatic environmental impact statement (PEIS) to evaluate the anticipated impacts of implementing the CVPIA. The PEIS will serve as the appropriate level of NEPA, ESA, and FWCA compliance for firming up Level 2 supplies. It will also address effects associated with the use of refuge and return flows associated with full Level 4 supplies. There is no tiered environmental compliance requirement anticipated for these actions. The acquisition of Level 4 supplies will require tiered NEPA and CEQA, as well as additional ESA and FWCA compliance.

The *Refuge Water Supply Conveyance Alternatives Refinement Memorandum* (Memorandum)

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[1] The CVPIA was signed into law on October 30, 1992, as Title XXXIV of Public Law 102-575. The CVPIA mandated changes in CVP management, particularly to protect, restore, and enhance fish and wildlife. The CVPIA includes approximately 103 programs and activities.

[2] The quantity, quality, and timing of water supplies to refuges are in accordance with parameters specified in Reclamation's March 1989 *Report on Refuge Water Supply Investigations, Central Valley Hydrologic Basin, California*, and the *San Joaquin Basin Action Plan/Kesterson Mitigation Plan Report*. The actual quantities of water associated with each level and the required additional increment for each refuge are identified in Chapter II, Tables II-2 and II-3 of this EA/IS.

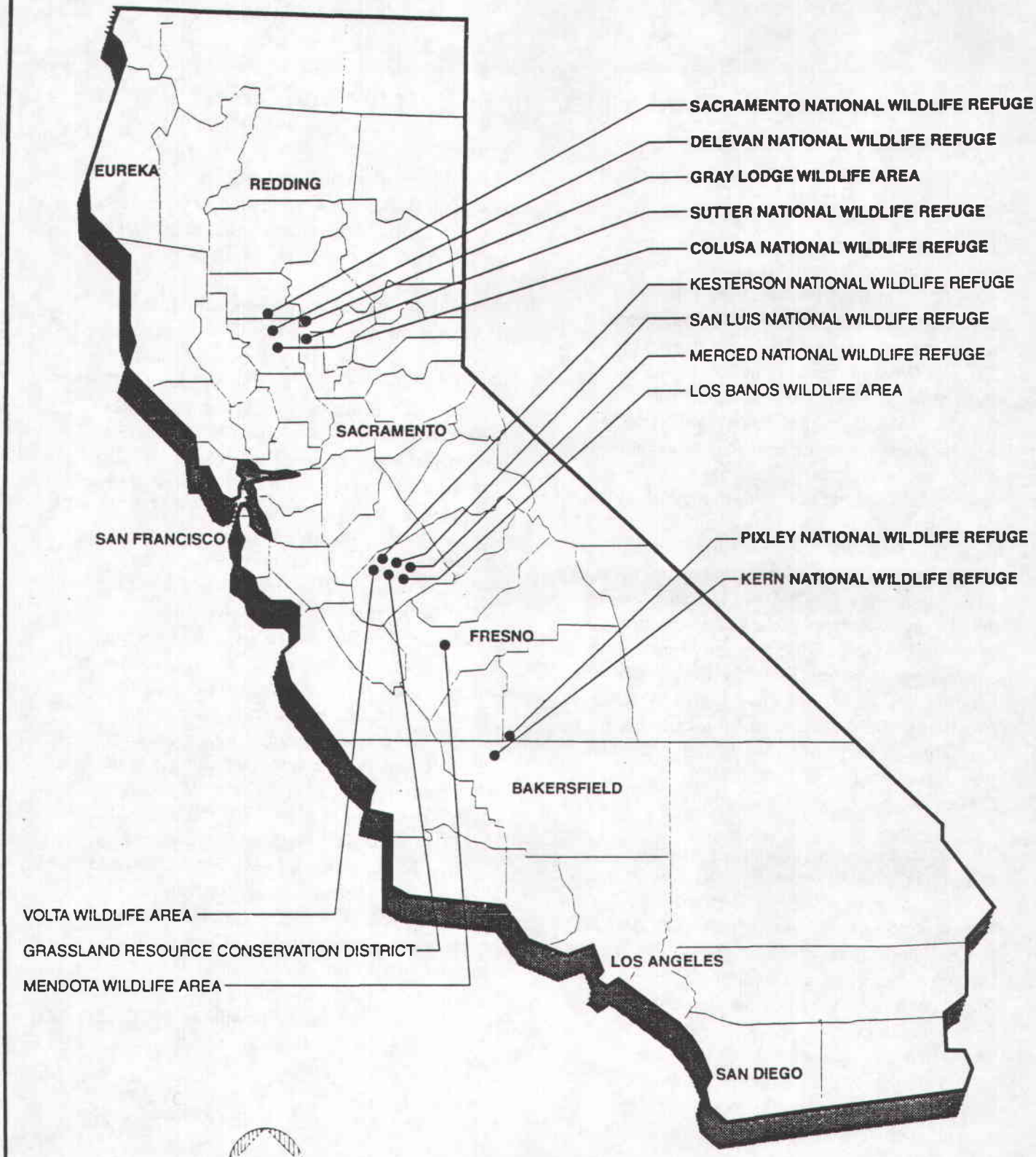

FIGURE I-1
WILDLIFE REFUGE AREAS IDENTIFIED IN CVPIA
U.S. BUREAU OF RECLAMATION
EAST SACRAMENTO VALLEY, CALIFORNIA

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published in May 1995 summarizes the results of alternative refinement activities presented in the *Decision Document* for the Sacramento, Delevan, Colusa, Sutter, Gray Lodge, Kern, and Pixley refuges.

This EA/IS focuses on the environmental compliance phase of the project and addresses anticipated effects of constructing and/or improving existing conveyance facilities to the Sutter NWR and the Gray Lodge WA. Two separate EA/IS documents are being prepared concurrently for the following two additional study areas within the Central Valley, the purpose of which is to identify anticipated effects to the following five NWRs:

West Sacramento Valley:

- Sacramento NWR
- Delevan NWR
- Colusa NWR

South San Joaquin Valley:

- Kern NWR
- Pixley NWR

In addition, separate site-specific environmental impact analyses are being prepared for the conveyance of water supplies to the San Joaquin Basin Action Plan (SJBAP) lands, which include Kesterson, San Luis, Merced, and Los Banos NWRs; Volta Wildlife Area (WA); and the Grassland Resource Conservation District. An environmental analysis is also being prepared to address the impacts of conveying water supplies to the Mendota WA.

Actions associated with the overall refuge water supply program include long-term contractual agreements for firm Level 2 and Level 4 (full-habitat development) water supplies, acquisition of Level 4 supplies, and the development of water shortage policy. Ongoing actions associated with conveyance include temporary conveyance agreements for the use of existing facilities, use of State Water Project (SWP) facilities, and long-term studies of conveyance alternatives to transport the water from the Delta Mendota Canal/State Water Project to the refuge boundary. On-refuge improvements are not directed by CVPIA. Related to both water supply and conveyance is the sharing of costs with the state under CVPIA.

Purpose and Need

Reclamation, in cooperation with the Service and the Department, is proposing to provide and/or improve existing conveyance facilities to deliver those quantities of water required for full habitat development on the Sutter National Wildlife Refuge (NWR), and Gray Lodge Wildlife Area (WA) located in the East Sacramento Valley.

The purposes of this conveyance project are to:

- Provide or upgrade facilities to support peak flow and year-round delivery of water supply requirements.

- Minimize any adverse impacts on the environment resulting from the implementation of the conveyance alternative selected to convey needed water supplies.

The need for the Conveyance of Refuge Water Supply Project is a result of capacity constraints and/or maintenance requirements in existing delivery systems. Currently, water supplies are conveyed on an as-available basis, which is not consistent with refuge needs.

Existing facilities were not designed to convey peak refuge requirements in addition to existing customer demands or are dewatered for maintenance purposes, and therefore are precluded from year-round delivery capability. Facility capacities must be able to support scheduled maximum peak flows as identified in Table II-2 for those refuge areas in the Reclamation's March 1989 *Report on Refuge Water Supply Investigations, Central Valley Hydrologic Basin, California,* and the 1989 *San Joaquin Basin Action Plan/Kesterson*

Mitigation Action Plant Report, which was incorporated by reference into the CVPIA. The report specified two primary levels of water supplies, Level 2 and Level 4. Water supplies must be provided as firm, reliable, long-term entitlements for full habitat development needs of refuges.

Project Scoping

Four public scoping meetings and four public workshops were held at the following locations on the dates indicated to solicit input on the preparation of the West Sacramento Valley, East Sacramento Valley, and South San Joaquin Valley EA/ISs, as well as the Action Plan Lands and Mendota documents:

Public Workshops	Public Scoping Meetings
• Tulare (June 5, 1995)	• Tulare (March 1994)
• Santa Nella (June 6, 1995)	• Los Banos (March 1994)
• Willows (June 8, 1995)	• Willows (March 1994)
• Sacramento (June 9, 1995)	• Fresno (April 1994) (Kings River only)

These locations were selected because of their relatively central locations in relation to the study areas (see Figure I-1). The primary focus of the Tulare and Santa Nella meetings was to discuss issues associated with Kern NWR and Pixley NWR in the South San Joaquin Valley area. The Willows meeting focused on the Sacramento NWR, Delevan NWR, and Colusa MWR in the West Sacramento Valley study area, and the Gray Lodge WA and Sutter NWR in the East Sacramento Valley study area. The Sacramento meeting addressed concerns with all three of the study areas.

The primary issues raised included:

- Desire for clear description of Level 2 and Level 4 quantities
- Impacts to land use and surrounding uses
- Endangered species concerns
- Water delivery timing
- Anticipated source of water supplies
- Water transfers/land retirement
- Water quality concerns, including salt loading
- Concern over groundwater overdraft, particularly in the South San Joaquin Valley
- Use of existing water systems versus new conveyance systems
- Coordination with the CVPIA programmatic environmental impact statement (PEIS) and other ongoing CVPIA and related programs
- Agricultural and refuge drainage
- Screening criteria for alternatives
- CVP project power

Additional comments beyond the scope of this environmental document included questions about project funding and agreements and terms with existing and proposed water districts in the vicinity of each refuge. While these issues are not analyzed in this document, they are key issues in determining a recommended alternative for each refuge and were used in the selection process.

Public Review

The Draft Environment Assessment/Initial Study was released on April 30, 1997 for a 45-day public comment and review period. Reclamation and the California Department of Fish and Game held a public meeting on June 25, 1997 in Sacramento, California to accept verbal comments on the draft document. Written comments were received from the following agencies and entities:

- Tehama-Colusa Canal Authority-May 21, 1997

- South Delta Water Agency- May 28, 1997
- California Department of Transportation– June 2, 1997
- Governor's Office of Planning and Research- June 10, 1997 (notification of close of comment period)
- Sacramento River Preservation Trust- June 27, 1997
- DeCuir & Somach-July 1, 1997

Comment letters and responses are included in Appendix C.

Relationship of This EA/IS to the CVPIA

Reclamation is currently preparing a PEIS evaluating the impact of implementation of the CVPIA. The PEIS will evaluate the impact of the long-term delivery of CVP water supplies to the 14 federal, state, and private wetland habitat areas. In addition, the PEIS will evaluate the system-wide impacts of implementing other provisions of the CVPIA, including the renewal of CVP contracts, the dedication of project yield for fish, wildlife, and habitat restoration, and the acquisition of Level 4 supplies in terms of system-wide effects. Acquisition of Level 4 water supplies will be further analyzed in subsequent site-specific documents. The cumulative impact contribution of the proposed action is addressed in Chapter V, Cumulative and Growth-Inducing Impacts. An interim EA to allow for a portion of the incremental increase up to full Level 4 supplies was prepared in September 1994.

Required Permits and Approvals

The following permits/authorizations will be required to implement any of the conveyance alternatives which impact streams or wetlands:

- Regional Water Quality Control Board:
  - National Pollutant Discharge Elimination System (NPDES)/General Construction Activity Storm Water Permit
  - Waste Discharge Waiver or Waste Discharge Requirements
- U.S. Army Corps of Engineers:
  - Section 404 Individual or Nationwide Permit (wetlands)
- California Department of Fish and Game:
  - Section 1601 Streambed Alteration Agreement

The NPDES permit is required for any activity that would disturb more than 5 acres.

If it is determined that implementation of an alternative would result in the incidental take of a federally or state listed threatened or endangered species, consultation and approval would be required by the Service and Department in compliance with the federal and state ESAs and by means of a Memorandum of Understanding, respectively. The potential for such impacts is addressed in Chapter IV under Biological Resources.

Alternatives that would encroach on state or private facilities or lands would require encroachment permits from the appropriate entity, including the California Department of Water Resources (DWR) where SWP facilities are affected and the California Department of Transportation.

Alternatives that would potentially affect cultural resources that are either eligible for listing or listed in the National Register of Historic Places (NRHP) would require coordination and possibly approval from the State Historic Preservation Office (SHPO) and the Advisory Council on Historic Preservation (ACHP). The potential for such impacts is addressed in Chapter IV under Cultural Resources.

Chapter II

Background

Introduction to East Sacramento Valley Study Area

The East Sacramento Valley study area extends from the east side of the Sacramento River east to the western edge of the Sierra Nevada Mountain Range. The area is primarily agricultural and rural. Principal urban areas are Chico, Oroville, and Yuba City. The study area (Figure II-1) encompasses Butte, Yuba, and Sutter counties. The study area at one time supported vast areas of wetland habitat for migrating waterfowl. Although much of this land has been converted to agricultural use, small habitat areas remain. In addition, portions of agricultural land also provide some habitat.

Agricultural land use surrounding the wetland habitat areas in this study area involves the production of field and grain crops, including rice, hay, and pasture lands. These lands can provide important habitat for wildlife; rice fields in particular have especially high values as wintering and resting habitat for migratory waterfowl especially if they remain flooded during the fall/winter period. These lands are intensively farmed using irrigation supplies from surface-water rights, CVP and SWP supplies, as well as through means of limited groundwater pumping.

Two areas were created to provide habitat for migratory waterfowl within the study area: Sutter NWR and Gray Lodge WA. Sutter NWR is considered a part of the Sacramento Complex, which is managed by the Service. The Gray Lodge WA is managed by the Department. The refuges are primarily served by the Sutter Extension Water District (SEWD) and the Biggs-West Gridley Water District (BWGWD), respectively. SEWD obtains its water from the Feather River using SWP facilities through existing agreements. Water is subsequently conveyed through existing canals and streams.

The Gray Lodge WA receives no supplies from BWGWD from mid-January to mid-April when BWGWD's main canal is dewatered for maintenance.

No new facilities (i.e., canals, pumps, major water control structures, etc.) are necessary on Sutter NWR and Gray Lodge WA. Major rehabilitation of a few (probably less than five) existing facilities may be required.

Habitat management on Sutter NWR and Gray Lodge WA has been affected by a restrictive water supply. Restrictions include both timing and quantity of delivery, while few problems with quality have been experienced. Table II-1 provides a list of the habitat maintained in an "average" water year.

Refuge objectives and habitat management practices are influenced by a recognition of historic, pre-development landscape conditions of the valley, and their intrinsic values. Refuge staff strive to manage every habitat acre to produce the most optimal benefits possible. The resulting mosaic of communities provide food, water, and cover for a diverse array of wildlife species. Those benefitting include both plants and animals whether endangered or abundant, resident or migratory, game or nongame. Management policies based on resource priorities provide opportunities for public recreation, education, and management-oriented research while ensuring satisfactory habitat utilization by wildlife.

Given these priorities and the advent of CVPIA secure (Level 2) and increasing (Level 4) water supplies, Sutter NWR and Gray Lodge WA can implement significant improvements in habitat

Table II-1 East Sacramento Valley Refuge Habitat Distribution		
Habitat	Acreage	
	Sutter NWR (acres)	Gray Lodge WA (acres)
Seasonal Marsh	1,509	2,830
Watergrass	332	1,271
Summer Water	86	320
Permanent Pond	60	300
Upland	150	1,600
Total	**2,137**	**6,321**

management programs. These changes include, but are not limited to, the following:

1. An earlier fall flood-up schedule for seasonal marsh to allow increased wildlife use, while easing water conveyance capacity constraints as a result of timing.

2. Maintenance of additional acres of both summer water and permanent pond habitat types for both wildlife use and vegetation improvement.

3. Increased acreage of watergrass and increased frequency of irrigations, if necessary, to provide a high-quality carbohydrate food source, while easing potential waterfowl crop predation problems.

4. Increased "flow-through" of maintenance water levels in all wetlands habitat units to decrease the potential of disease outbreaks, especially botulism, in wildlife species using these habitats.

5. Maintenance of water depths, using the year-round water delivery, that provide optimum foraging conditions for the majority of avian species.

6. Control of undesirable vegetation species, such as cocklebur, using deep irrigation and maintenance for periods of 2 to 4 weeks during the summer.

7. Increased water availability to enhance recreation uses including fishing, hunting, and wildlife viewing.

Sutter National Wildlife Refuge

Sutter NWR was established in 1944, and it encompasses 2,591 acres in Sutter County 8 miles southwest of Yuba City. Most of the refuge is located within the Sutter Bypass, north of its confluence with the Tisdale Weir. The refuge is the only publicly owned wetland habitat area in the Sutter Basin. Historically, flood flows from the Sacramento River, Butte Sink, and the Feather River inundated large portions of the Sutter Basin. However, most of this land has been protected from flooding by levees and has been developed for agricultural production. Water is used on the refuge to maintain ponds and moist soil plants, and to irrigate millet fields. The ponds support waterfowl food sources such as swamp timothy, millet, and invertebrate populations. Approximately 500 acres of the refuge provide habitat for geese, upland birds, and other wildlife species.

The refuge has five wells to supplement surface-water flows under a conjunctive use program. The groundwater is not used because it contains high levels of arsenic and possibly

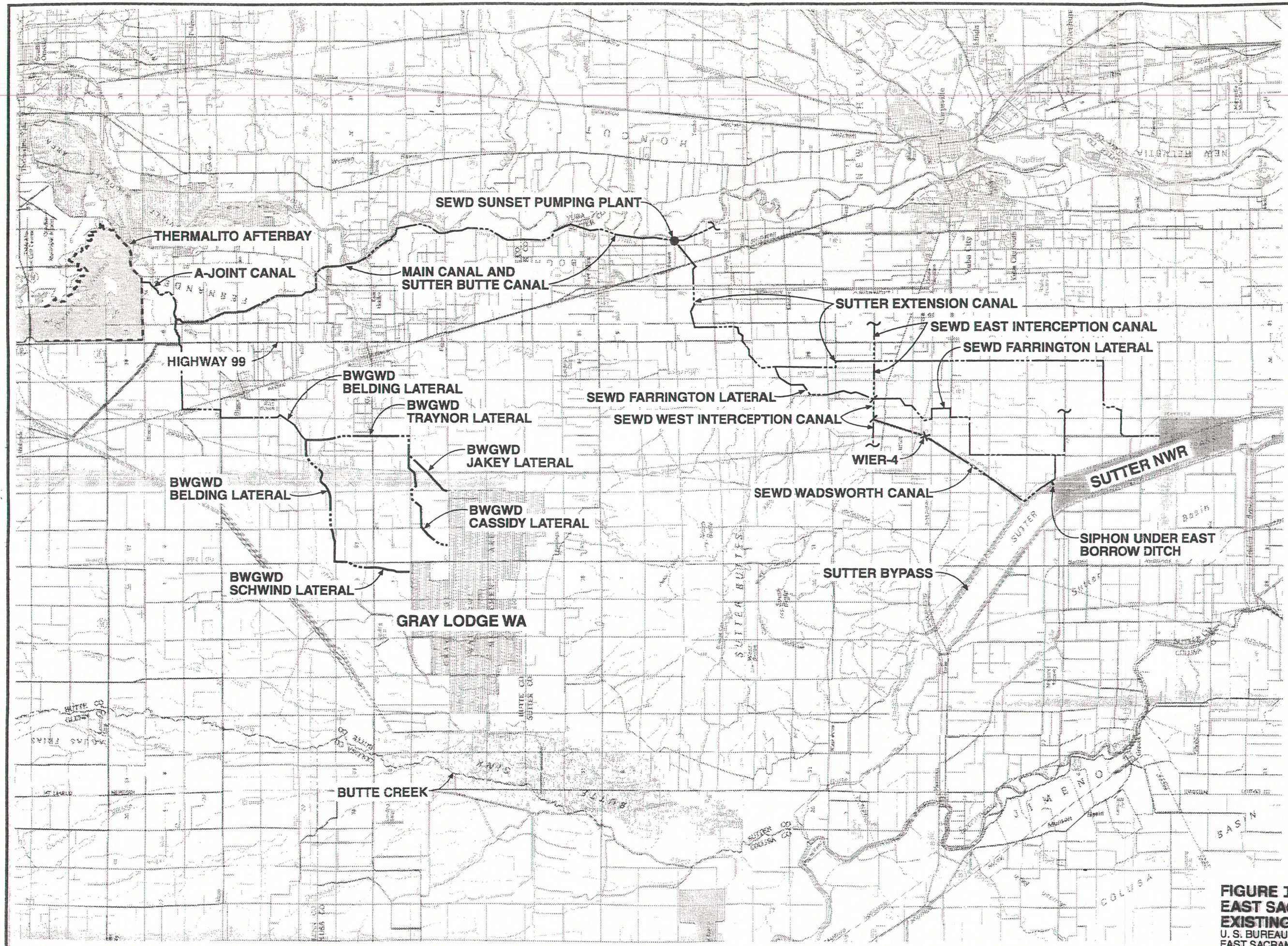

FIGURE II-1
EAST SACRAMENTO STUDY AREA
EXISTING STREAMS AND CANALS
U. S. BUREAU OF RECLAMATION
EAST SACRAMENTO VALLEY, CALIFORNIA

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mercury, and because of high pumping costs (Reclamation, 1995; Reclamation and Service, 1995).

CVPIA Water Requirements

The water supply requirements for Sutter NWR are presented in Table II-2. The historical water delivery to the refuge is identified as Level 2. Level 4 water is required to meet the objectives of Public Law 102-575, Title 34, of the CVPIA. The Level 4 design flows were reviewed with the refuge manager and were used for designing the conveyance facilities. Conveyance losses associated with delivery of Level 2 and Level 4 supplies are also identified.

Existing Water Source

More than 85 percent of the water supply for the refuge comes from irrigation and return flows in the East and West Borrow Ditches of Sutter Bypass, if and when they are available. Agricultural return flows make up the majority of the summer flows, while rainfall, runoff, and flood flow make up the majority of winter flows. Aside from this naturally occurring run-off via the Sutter Bypass, Sutter NWR has two state appropriative water rights, one for 25 cubic feet per second (cfs) (June 1 through October 30) from the East Borrow Ditch, and one for 5 cfs (April 15 through October 1) from the West Borrow Ditch. These appropriative water rights do not have a high priority number and are not a dependable water source. The primary source of water for BWGWD is the Feather River and the Thermalito Afterbay, which is a part of the SWP. Naturally occurring flood flows and agriculture return flows supply the refuge lands located within the Sutter Bypass levees. During the summer and fall irrigation periods, agriculture return flows are the primary source of water within the bypass. These flows are diverted from the East and West Borrow Ditches (ditches within the bypass) using weirs to back up water into the refuge's distribution ditches. Water has been purchased from SEWD in the past for the refuge area located outside of Sutter Bypass.

Current Delivery Methods

The Sutter NWR receives surface-water supplies from two sources: the SEWD and the Sutter Bypass. SEWD supplies the refuge lands located outside of the Sutter Bypass levees, approximately 450 acres at the southeast corner of the refuge, through the Sutter Extension Canal. The Service and SEWD have an annual agreement that allows the Service to purchase water at the discretion of SEWD; however, there is no contracted amount of water that must be delivered to Sutter NWR.

Gray Lodge Wildlife Area

Gray Lodge WA was established in 1931, and it encompasses 8,400 acres in Sutter and Butte counties near the City of Gridley. The WA is managed by the Department. Gray Lodge WA is located adjacent to the Butte Sink, an overflow area of Butte Creek and the Sacramento River, and supports ponds, marshlands, wheat fields, and uplands. Wetland areas support waterfowl food sources such as swamp timothy and invertebrate populations and upland areas support habitat for geese, upland bird, and other wildlife species.

CVPIA Water Requirements

Water supply requirements for Gray Lodge WA are presented in Table II-3. The historical water delivery to the refuge is identified as Level 2. Level 4 water is required to meet the objectives of Public Law 102-575, Title 34 of the CVPIA. Level 4 design flows were reviewed with the refuge manager and were used for designing conveyance facilities. Conveyance losses associated with delivery of Level 2 and Level 4 supplies are also identified.

Table II-2
Water Supply Requirements for Sutter NWR

Month	Level 2 Needs[a] (ac-ft)	Level 4 Needs[a,b] (ac-ft)	Level 4 Design Flows[b,c] (cfs)
January	950	1,800 (1,200)	30
February	1,000	2,300 (1,300)	39
March	1,000	3,420 (1,300)	57
April	950	1,200 (1,200)	20
May	1,100	1,440 (1,440)	24
June	1,300	1,680 (1,680)	30
July	1,300	1,680 (1,680)	30
August	3,800	1,680 (4,800)	30
September	4,500	4,000 (5,800)	67
October	3,800	4,800 (4,800)	80
November	1,900	3,500 (2,400)	59
December	1,900	2,500 (2,400)	42
Total	**23,500**	**30,000 (30,000)**	
Conveyance Losses	2,611[d]	3,333[d]	
Total Amount to be Diverted	26,111[d]	33,333[d]	
Difference between Level 2 and Level 4	7,222		

[a]Reclamation. 1989. *Report on Refuge Water Supply Investigations.* March.
[b]Number shown in parenthesis indicating Level 4 needs identified in Reclamation Refuge Water Supply Investigation are superseded.
[c]Service. 1994. Sacramento NWR Complex, Refuge Manager. February 18. Revised August 16. Revised November 22.
[d]CVP provides Level 2 through exchanges. Conveyance loss on CVP and Level 4 water is 10 percent.

Table II-3
Water Supply Requirements for Gray Lodge WA

Month	Level 2 Needs[a] (ac-ft)	Level 4 Needs[a] (ac-ft)	Level 4 Design Flows[b] (cfs)
January	1,050	1,320	22
February	1,050	1,320	22
March	1,050	1,320	22
April	1,050	1,320	22
May	2,500	3,080	55
June	3,500	4,400	75
July	2,500	3,080	55
August	2,850	3,520	60
September	7,100	8,800	150
October	6,750	8,360	140
November	4,600	5,720	96
December	1,400	1,760	30
Total	**35,400**	**44,000**	
Conveyance Losses	5,202[c]	6,964[c]	
Total Amount to be Diverted	40,602[c]	50,964[c]	
Difference between Level 2 and Level 4	10,362		

[a]Reclamation. 1989. *Report on Refuge Water Supply Investigations.* March.
[b]Department. 1994. *Gray Lodge WA, Water Management Coordinator.* February 4.
[c]BWGWD provides Level 1, CVP through exchanges provides remaining Level 2. Conveyance loss on CVP water is 17 percent.

Existing Water Source

Gray Lodge WA would require some new improvements to existing facilities fully utilize Level 4 supplies at full Level 4 deliveries. Rehabilitation of at least three delivery points would be required. All conveyance alternatives for Gray Lodge WA, will require some pumping with deep wells and low lift pumps. Gravity supply is not available in several areas.

Full utilization of habitat management at Gray Lodge WA is impacted by restrictions in water supply, including both timing and quantity of delivery. To date, habitat has been maintained and managed as presented in Table II-1, which is based on an average water year, although this habitat is currently not being managed at full potential because of water restrictions.

With the forthcoming of CVPIA in securing a firm water supply of Level 2 and Level 4 water, the Gray Lodge WA will be able to implement significant improvements in the habitat management that is needed to manage the area at its optimum potential.

Water is used on the Gray Lodge WA to maintain ponds and seasonal marshes, and to irrigate millet grown for waterfowl food. The amount of wetlands in this area varies annually with the availability of water.

Approximately 2,600 acres of Gray Lodge WA are located within the BWGWD. Gray Lodge WA receives water from BWGWD and appropriative water through exercise of water rights from the Reclamation District (RD) 833 and 2054 drains. BWGWD allocates up to 12,000 ac-ft annually to Gray Lodge WA, but only 8,000 to 10,000 ac-ft is available during the wetlands irrigation season (April to November). Gray Lodge WA also diverts water from the RD 833 Drain and RD 2054 Drain, which convey agricultural return flows, claimed by the WA under appropriative rights. More than 40 percent of the water supply for Gray Lodge WA is supplied by groundwater wells. This supply averages about 26,500 ac-ft annually. Other water supplies can be obtained by purchases from the SWP via Thermolito Afterbay.

Depth to groundwater ranges from 20 to 140 feet and averages 100 feet at the WA, and the groundwater quality is suitable for waterfowl and irrigation needs. Operations records for wells indicate a safe yield for the aquifer of 12,000 ac-ft annually (Reclamation, 1992; CH2M HILL, 1994).

Current Delivery Method

Gray Lodge WA currently receives water from a combination of surface-water and groundwater sources. As a customer of the BWGWD, Gray Lodge WA has both primary and secondary surface-water rights, which are supplied from the Thermalito Afterbay, through the A-Joint Canal and BWGWD's Belding Lateral, to four delivery points at the Gray Lodge WA boundary via the Rising River, Schwind, Jakey, and Cassidy laterals. Additional water purchased through the SWP is also conveyed from the Thermalito Afterbay through these same facilities, when necessary, to augment other supplies. BWGWD facilities are shut down from mid-January to mid-April for maintenance.

Gray Lodge WA also has appropriative water rights supplied from diversions on the RD 833 Drain and the RD 2054 Drain, where these drains cross the WA boundary. The water in these drains is a combination of agriculture and natural runoff, depending on the time of year. The amount of water available in these drains during the normal irrigation season has been decreasing as area farms improve irrigation efficiency and implement drainage capture and reuse programs. This is not considered a firm water supply by Gray Lodge WA.

Groundwater is also used to supply a portion of the annual demand on the Gray Lodge WA. Twenty-one deep groundwater wells are used onsite, as necessary, to supplement surface-water deliveries and to supply water to portions of the Gray Lodge WA that cannot be reached by gravity flow from surface supplies. Annual

groundwater pumping varies considerably. For the water year May 1993 through April 1994, Gray Lodge WA pumped 2,605 ac-ft; whereas for the water year May 1994 through December 20, 1994, Gray Lodge WA pumped 16,158 ac-ft.

Chapter III
Description of Alternatives

Introduction

This section identifies alternative conveyance methods of providing firm, Level 4 supplies to each of the two refuge areas, as well as the No-Action alternative. The preferred alternative and selection process associated with each refuge is identified in the refuge-specific alternative descriptions below.

Screening Criteria

The initial development of alternatives was based, in part, on the previous studies completed by Reclamation regarding refuge water supply. Four primary investigations were considered in the initial development of alternatives:

- *Report on Refuge Water Supply Investigations, Central Valley Hydrologic Basin, California*, 1989
- *San Joaquin Basin Action Plan/Kesterson Mitigation Action Plan Report*, 1989
- *Refuge Water Supply Study, Plan Coordination Team Interim Report*, 1992
- *Refuge Water Supply, Proposed Plan of Study Report*, 1993

In addition to the alternatives that were presented in these investigations, the study team developed additional alternatives for consideration. These alternatives generally involved conjunctive use of the groundwater resources to the extent possible, and alternative conveyance routing options.

Public involvement meetings were held with the interested parties for refuge water supplies. A key objective of these meetings was to preview the alternatives being considered for the investigation, receive input and comments on these alternatives, and solicit additional alternatives for consideration. In some instances, additional alternatives were forthcoming from the public involvement meetings. These alternatives were included in subsequent evaluations.

Following the development of the alternatives for each refuge using the process described above, an initial screening process was employed. This initial screening process was used to eliminate from further consideration any alternatives that had fatal flaws, resulting from either excessive costs, unreasonable engineering requirements, or unacceptable environmental impacts. Following initial screening of the alternatives, all remaining alternatives were developed to the same level of detail in this investigation.

For the SJBAP lands, more detail was incorporated into the analysis of conveyance alternatives. This higher degree of detail was available because Interior's activities on conveyance alternatives had started before the passage of the CVPIA due to required compliance with the Action Plan Lands Cooperative Agreement and mitigation for Kesterson. Therefore, more information was available on these lands.

A number of agency workshops, discussions with water purveyors, and scoping meetings were held in early June 1995. During these workshops and meetings, the alternatives presented in this document were determined to be feasible in terms of accomplishing the purpose and need of the proposed action. The process used to determine feasibility and the results of these investigations are presented in the April 1995 *Decision Document Report of Recommended Alternatives Refuge Water Supply and San Joaquin Basin Action Plan Lands* (Decision Document). Reclamation and

the Service further refined the alternatives selected in the Decision Document in a May 1995 document entitled *Refuge Water Supply Conveyance Alternatives Refinement Memorandum* (Memorandum). This process included discussions with each of the potential water purveyors to verify system constraints and necessary improvements.

This EA/IS analyzes alternatives that were determined to be feasible as presented in the Memorandum. The primary screening criteria used to determine feasibility included:

- Cost
- Reliability of water supply
- Environmental constraints
- Social/institutional constraints

In addition, selections were predicated on ensuring a broad, reasonable range of alternatives to carry through the NEPA/CEQA process. This EA/IS evaluates the potential environmental impacts of implementing any of the proposed alternatives to each refuge, in addition to discussing the anticipated social and institutional constraints.

Recommended Alternatives

The selection of recommended alternatives for the conveyance of refuge water supplies for each refuge area was based on input from Reclamation, Service, and Department staff, including staff from each of the refuge areas. In order to document the selection process, it was determined that a number of factors should be identified, which could be used across refuge areas and weighted according to their relative importance. The following six factors were identified (the proportionate weighting factor is indicated in parenthesis) as best capturing the primary issues:

- Water supply reliability (30)
- Water quality (15)
- Environmental issues (20)
- Cost-effectiveness (20)
- Implementation (10)
- Engineering (5)

Using these six factors and weighting approach, matrices were created to rank each of the alternatives addressed in detail in this EA/IS. The recommended alternative was the alternative that received the highest overall score. A summary of the alternative selection process is described below. A full description of each alternative, including No-Action follows this discussion.

Sutter National Wildlife Refuge

Briefly summarized are the three alternatives that are under consideration:

- SUT-8—Use existing canals from Thermalito Afterbay, construct new pipeline from Sutter Extension Canal

- SUT-9— Use existing canals from Thermalito Afterbay, construct new pressure pipeline from Sutter Extension Canal

- SUT-10—Use existing canals, enlarge Farrington Lateral, modify existing siphons

The SUT-10 alternative was selected as the recommended alternative primarily due to its relatively low capital cost, limited environmental impacts associated with the least amount of construction impacts, and relatively minor implementation and engineering issues. The SUT-8 alternative was ranked slightly more favorable than SUT-9 and was ranked highest in terms of water supply reliability and water quality associated with constructing a pipeline from the Sutter Extension Canal. The SUT-9 alternative was ranked even with SUT-8 in most categories except water supply reliability and engineering because of assumed greater potential for maintenance-related problems associated with a pressure pipeline in relation to a the gravity pipeline included as part of SUT-8.

Gray Lodge Wildlife Area

Briefly summarized are the four alternatives that are under consideration:

- GRA-1—Construct new pipeline from Thermalito Afterbay
- GRA-3—Construct new canal from Thermalito Afterbay
- GRA-9—Use Biggs-West Gridley (BWGWD) facilities with improvements
- GRA-14—Use Butte Water District (BWD) facilities with improvements

The GRA-9 and GRA-14 alternatives were determined to be equally ranked as recommended. GRA-9 was ranked slightly higher with regard to water quality, environmental issues and engineering. GRA-9 was determined to be the least costly but only by a small degree as compared to GRA-14. GRA-9 was considered the least reliable based on historic operations, while GRA-14 was ranked only slightly higher due to BWD being very interested to serve the area but needing to construct a number of new facilities. GRA-3 was ranked lowest due to high capital cost and implementation and environmental issues associated with a major permanent concrete-lined canal. GRA-1 was determined to be the most expensive alternative, but was ranked high in terms of water reliability and water quality due to direct connection with Thermalito Afterbay.

No-Action Alternative

Implementation of the No-Action alternative would result in no additional firm supplies for either of the two refuge areas. Each refuge would continue to receive deliveries through the existing delivery systems according to existing agreements. These supplies would not be firm and in many cases would not exceed Level 2 supplies.

In terms of related future actions, this document is based on the assumptions developed in the preparation of the CVPIA PEIS. As such, this alternative incorporates anticipated development and conditions in the year 2020. This year was selected to provide a reasonable basis from which to compare alternatives. It is assumed that by the year 2020, CVP and SWP supplies will be essentially fully utilized as a result of urban growth and continued agricultural demands. Other key overall assumptions which are a part of the No-Action alternative for the PEIS include:

- Existing CVP and SWP project features and management policies (such as 1992 CVP Long-Term Operating Criteria and Plan) as of October 1, 1995 remain in effect
- Existing CVPIA implementation programs in place as of October 1, 1995 would continue
- Long-term biological opinion for winter-run chinook salmon, and the 1995 biological opinion for Delta smelt would be met by the CVP and SWP in compliance with the federal and state ESAs
- Use of existing CVP and SWP facilities would continue in accordance with the Coordinated Operations Agreement (COA) between Reclamation and the Department of Water Resources
- May 1995 Bay-Delta Water Quality Control Plan standards, which tier off the PEIS, would be met

Conveyance Alternatives For Sutter NWR

The results of the alternatives screening process for Sutter NWR are presented in Table III-1. Alternatives determined to be feasible as presented in the Memorandum are highlighted in bold.

The three proposed alternatives for developing an increased, reliable water supply for the Sutter NWR (Figure III-1) are discussed in this section. Conveyance facilities that would be needed on-refuge are not included. Facility sizing was based on the design criteria presented in previous documents and on the Level 4 design flow of 80 cfs presented previously in Table II-2.

SUT-8–Gravity Pipeline

SUT-8 would convey water from the Thermolito Afterbay through the A-Joint Canal and the Main Canal/Sutter Butte Canal to the Sutter Extension Canal. During the months of May through August, these canals do not have adequate capacity to accommodate Level 4 refuge flows in addition to existing deliveries. Therefore, additional water for the refuge would be diverted from the Feather River at the Sunset Pumping Plant into the Sutter Extension Canal as necessary.

Water would be conveyed down the Sutter Extension Canal and diverted into a new 32,000-foot-long, 66-inch-diameter gravity flow pipeline, immediately downstream of the East/West Interceptor Canal crossing. The new pipeline would follow an alignment parallel to the East/West Interceptor Canal to the Wadsworth Canal. Here the pipeline would follow the Wadsworth Canal right-of-way to the Sutter Bypass. The pipeline would follow the east levee of the bypass to a point adjacent to the existing refuge diversion. The pipeline would then cross beneath the East Borrow Ditch and end at a new discharge structure located at the existing refuge distribution canal. In addition, this alternative assumes that a long-term wheeling agreement will be in place.

Facilities required for this alternative are presented in Table III-2.

SUT-9–Pressurized Pipeline

SUT-9 follows the same alignment and operation schedules as SUT-8; however, it replaces the gravity pipeline with a 32,000-foot-long, 48-inch-diameter pressure pipeline and associated pump station. The pump station would be located at the diversion point from the Sutter Extension Canal. The pressure pipeline would follow the same alignment as the gravity pipeline in SUT-8. This alternative assumes that a long-term wheeling agreement will be in place.

Facilities required for this alternative are presented in Table III-3.

SUT-10–Improvements To Existing Facilities

SUT-10 would convey water from the Thermolito Afterbay through the A-Joint Canal and the Main Canal/Sutter Butte Canal to the Sutter Extension Canal. During the months of May through August, these canals do not have adequate capacity to accommodate Level 4 refuge flows in addition to existing deliveries. Therefore, additional water would be diverted from the Feather River at the Sunset Pumping Plant into the Sutter Extension Canal as necessary.

Water would be conveyed down the Sutter Extension Canal to the Farrington Lateral. Approximately 10 to 15 cfs would continue down the Sutter Extension Canal to the southeastern portion of the refuge outside of the bypass levees. The remaining refuge water would be conveyed down the Farrington Lateral to an existing drain at McClatchy Road. The water would be diverted into the drain and conveyed to a point east of the east bypass levee, near the northeast corner of the refuge. A new siphon would then convey the water beneath the levee and the East Borrow Ditch and discharge it inside the existing refuge distribution canal. Excess drain water in the

Table III-1
Results of Alternative Screening Process For Sutter NWR

Alternative	Selection (Y/N)	Reason for Selection/Elimination	Potential Issues/Conflicts (Selected Alternatives Only)
SUT-1 (Thermolito Afterbay/ WCWD Canal/Butte Creek/Sutter Bypass)	N	Service was unsuccessful in implementing this alternative in 1977 because of water losses in Cherokee Canal and Butte Creek and lack of reliability. Does not provide a year-round supply of water.	N/A
SUT-2 (Thermolito Afterbay/ Feather River)	N	Most costly of the conveyance alternatives that use the Feather River.	N/A
SUT-3 (Same as SUT-2/ utilizes canal)	N	Potential conflict with upstream prescriptive rights users on Wadsworth Canal. Fishery impacts from diversions in East Borrow Ditch.	N/A
SUT-4 (Same as SUT-2/Main Canal and Sutter Butte Canal improvements)	N	Most costly of the conveyance alternatives that do not use the Feather River.	N/A
SUT-5 (Same as SUT-4/ utilizes concrete canal)	N	Potential conflict with upstream prescriptive rights users on Wadsworth Canal. Fishery impacts from diversions in East Borrow Ditch. High cost of Main Canal and Sutter/Butte Canal lining.	N/A
SUT-6 (Same as SUT-2/ utilizes pressure pipeline)	N	Potential conflict with upstream prescriptive rights users on Wadsworth Canal. Fishery impacts from diversions in East Borrow Ditch.	N/A
SUT-7 (Same as SUT-4/ utilizes pressure pipeline)	N	Potential conflict with upstream prescriptive rights users on Wadsworth Canal. Fishery impacts from diversions in East Borrow Ditch. High cost of Main Canal and Sutter/Butte Canal lining.	N/A
SUT-8	**Y**	**Feasible alternative–Provides for reasonable range of alternatives. Avoids upstream user diversions and fishery impacts.**	**Encumbrance of land. Temporary loss of agricultural land. Sunset Pumps reliability uncertainty, potential fishery impacts, and resultant need for screen improvements.**
SUT-9	**Y**	**Feasible alternative–Provides for reasonable range of alternatives. Avoids upstream user diversions and fishery impacts.**	**Encumbrance of land. Temporary loss of agricultural land. Sunset Pumps reliability uncertainty, potential fishery impacts, and resultant need for screen improvements; pumped system maintenance and power costs.**
SUT-10	**Y**	**Feasible alternative–Provides for reasonable range of alternatives. Low cost. Avoids upstream user diversions and fishery impacts. Uses existing facilities with modifications.**	**Encumbrance of land. Temporary loss of agricultural land. Sunset Pumps reliability uncertainty, potential fishery impacts, and resultant need for screen improvements.**

Table III-2
Proposed Facilities For Alternative SUT-8

Item	Description
1	Turnout Structure at Sutter Extension Canal • Design Flow: 80 cfs
2	Gravity Pipeline • Length: 32,000 lin ft • Diameter: 66 inches • Design Flow: 80 cfs
3	Pipeline Crossings–Bore-and-Jack • Railroad: 100 ft • Highway 20: 100 ft • Sutter Bypass Levee and East Borrow Ditch: 400 ft
4	Pipeline Crossings–Trenching • East Butte Road: 100 ft • Butte House Road: 100 ft • South Butte Road: 100 ft
5	Outlet Structure at Refuge Distribution Canal • Design Flow: 80 cfs

Table III-3
Proposed Facilities For Alternative SUT-9

Item	Description
1	Turnout Structure at Sutter Extension Canal • Design Flow: 80 cfs
2	Pump Station • Total Dynamic Head: 85 ft • Design Flow: 80 cfs • Horsepower: 1,030
3	Pressure Pipeline • Length: 32,000 lin ft • Diameter: 48 inches • Design Flow: 80 cfs
4	Pipeline Crossings–Bore-and-Jack • Railroad: 100 ft • Highway 20: 100 ft • Sutter Bypass Levee and East Borrow Ditch: 400 ft
5	Pipeline Crossings–Trenching • East Butte Road: 100 ft • Butte House Road: 100 ft • South Butte Road: 100 ft
6	Outlet Structure at Refuge Distribution Canal • Design Flow: 80 cfs

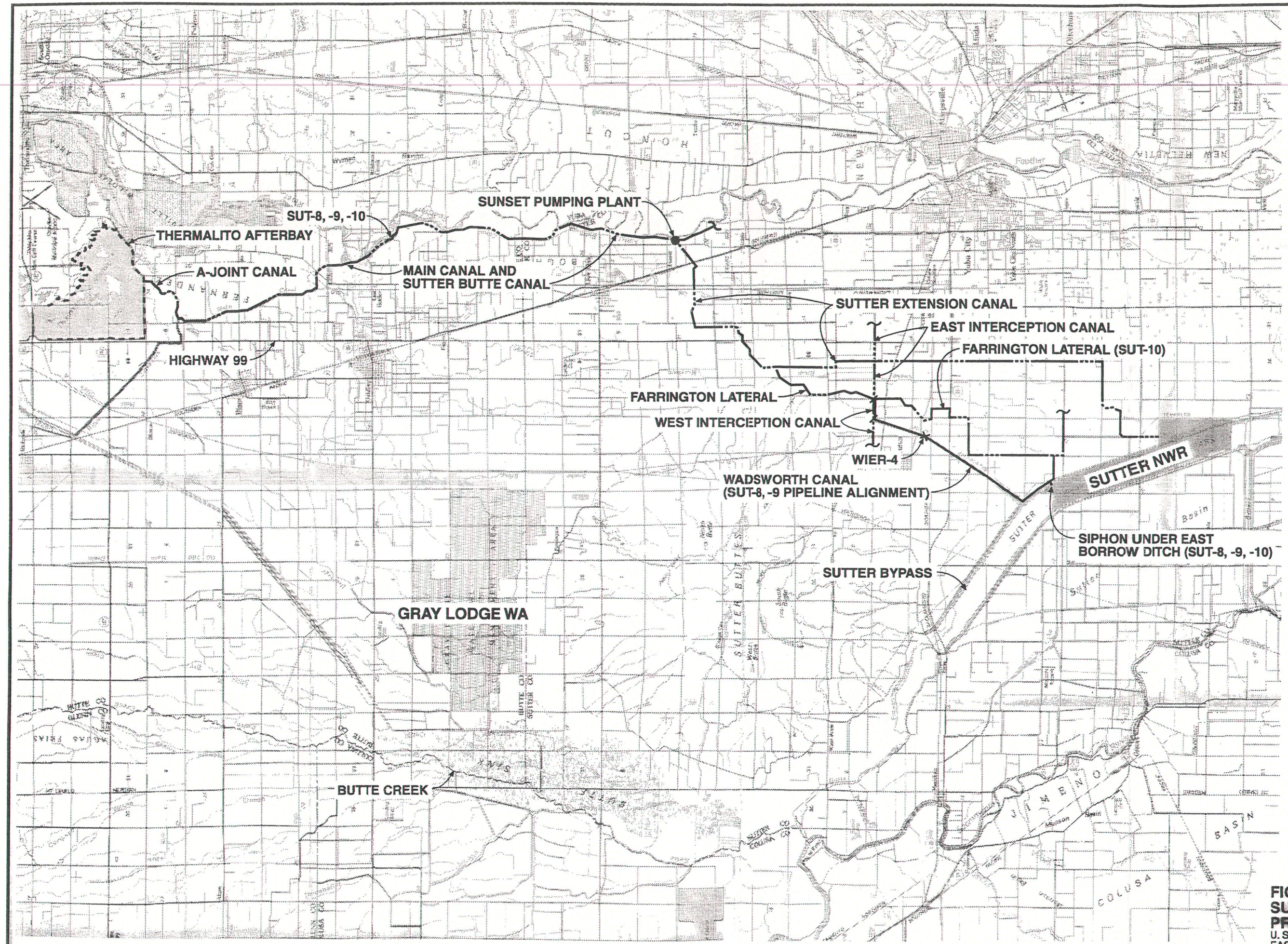

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FIGURE III-1
SUTTER NWR
PROPOSED ALTERNATIVES
U. S. BUREAU OF RECLAMATION
EAST SACRAMENTO VALLEY, CALIFORNIA

McClatchy Road drain would continue to discharge into the East Borrow Ditch.

It is not known at this time if the Farrington Lateral can accommodate Level 4 refuge flows in addition to peak deliveries to existing users. Discussions with SEWD staff indicate that during off-peak periods, capacity does exist for the refuge flows. Some expansion of the canal and modification of existing siphons may be necessary to provide capacity for peak irrigation demands and refuge flows. In addition, water in the canal may affect the water table in adjacent fields, which could interfere with equipment operation during harvest and pre-planting periods. Normally during these periods, the Farrington Lateral is dry or has minimal flows. In addition, this alternative assumes that a long-term wheeling agreement will be in place.

Facilities required for this alternative are listed in Table III-4. The extent of modifications to the Farrington Lateral and associated structures is not known. A conservative preliminary estimate assumes excavation to add 1 foot of depth and 2 feet of top width to the Farrington Lateral, and replacement or modification of all road crossings with a 90-inch-diameter siphon.

Conveyance Alternatives For Gray Lodge WA

The results of the alternatives screening process for Gray Lodge WA are presented in Table III-5. Alternatives determined to be feasible as presented in the Memorandum are highlighted in bold.

The four proposed alternatives for developing an increased, reliable water supply for the Gray Lodge WA (Figure III-2) are described in this section. Conveyance facilities that would be needed on-refuge are not included. Facility sizing was based on the design criteria presented in previous documents and on the Level 4 design flow of 150 cfs presented previously in Table II-2.

GRA-1–Gravity Pipeline

This alternative would convey water from the southwest corner of Thermalito Afterbay (corner of Highway 99 and Hamilton Road) through a 61,600-foot gravity pipeline to the northeast corner (Liberty Road and Pennington Road) of Gray Lodge WA. The design flow of 150 cfs would be conveyed in a 72-inch-diameter pipeline. In addition, this alternative assumes that a long-term wheeling agreement will be in place. Facilities required for this alternative are presented in Table III-6.

Table III-4
Proposed Facilities For Alternative SUT-10

Item	Description
1	Enlargement of Farrington Lateral • Design flow: 230 cfs (Ag flows and Refuge flows) • Excavation: 37,000 cubic yards
2	Modification and Installation of Siphons • Butte House Road: 100 ft • South Butte Road: 100 ft • Railroad: 100 ft • Highway 20: 200 ft • Sutter Bypass Levee and East Borrow Ditch: 400 ft
3	Outlet Structure at Refuge Distribution Canal • Design Flow: 80 cfs

Table III-5
Results of Alternative Screening Process For Gray Lodge WA

Alternative	Selection (Y/N)	Reason for Selection/Elimination	Potential Issues/Conflicts (Selected Alternatives Only)
GRA-1	**Y**	**Feasible alternative–Provides for reasonable range of alternatives. "Nonmechanical" alternative with minimal conveyance losses. Completely separate system, greater reliability.**	**Temporary impacts to agricultural operations/loss of production.**
GRA-2 (Same as GRA-1/pressure pipeline)	N	Costly alternative and considered less reliable than GRA-1.	N/A
GRA-3	**Y**	**Feasible alternative–Provides for reasonable range of alternatives. Least costly of the separate system alternatives (GRA-1, GRA-2, and GRA-3).**	**Encumbrance of land and loss of agricultural land.**
GRA-4 (Thermalito Afterbay/ improve BWGWD facilities)	N	The most costly alternative; total reliance on BWGWD.	N/A
GRA-5 (Same as GRA-4/Richvale Main/Cherokee Canal)	N	High conveyance losses, poor water quality, subject to upstream diversions.	N/A
GRA-6 (Same as GRA-5/concrete canal)	N	High conveyance losses, poor water quality, subject to upstream diversions.	N/A
GRA-7 (Same as GRA-5/ WCWVA facilities)	N	See GRA-5.	N/A
GRA-8 (Same as GRA-6/ WCWVA facilities)	N	See GRA-6.	N/A
GRA-9	**Y**	**Feasible alternative–Provides for reasonable range of alternatives. Uses existing onsite wells and existing BWGWD facilities with modifications.**	**Water quality/maintenance/power cost concerns associated with groundwater pumping conveyance losses associated with use of unlined canals.**
GRA-10 (Same as GRA-5 but does not require BWGWD facilities)	N	High conveyance losses, poor water quality, subject to upstream diversions.	N/A
GRA-11 (Same as GRA-6/concrete canal)	N	High conveyance losses, poor water quality, subject to upstream diversions.	N/A
GRA-12 (Same as GRA-10/ WCWVA facilities)	N	See GRA-10.	N/A
GRA-13 (Same as GRA-11/ WCWVA facilities)	N	See GRA-11.	N/A
GRA-14	**Y**	**Feasible alternative–Provides for reasonable range of alternatives. Combination of GRA-9 and Butte Water District facilities. Uses existing facilities with modifications.**	**Water quality, maintenance, and power cost concerns associated with groundwater pumping. Temporary impacts to agricultural operations/loss of production, encumbrance of land, loss of agricultural land, and conveyance losses associated with use of unlined canals.**

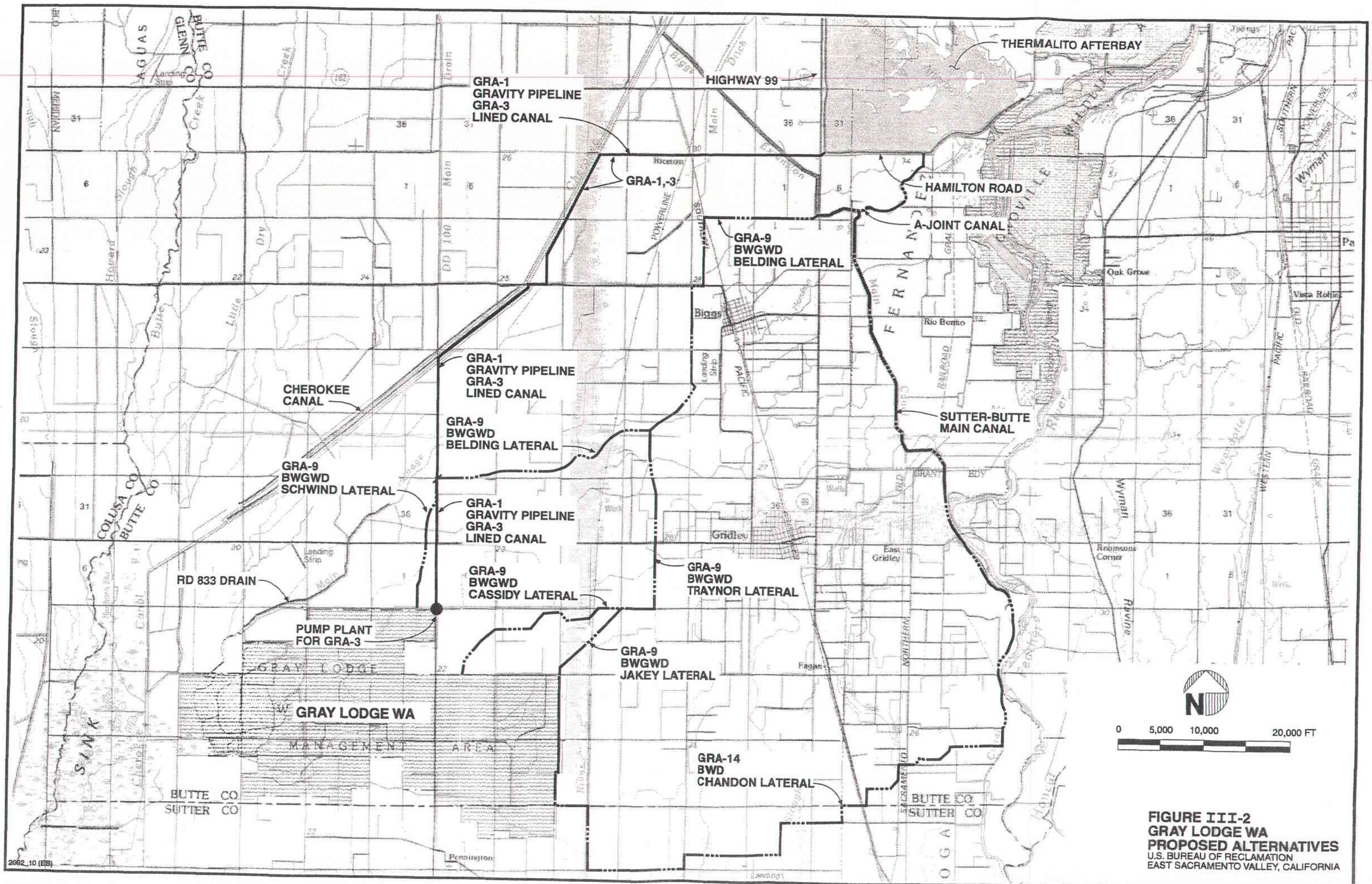

FIGURE III-2
GRAY LODGE WA
PROPOSED ALTERNATIVES
U.S. BUREAU OF RECLAMATION
EAST SACRAMENTO VALLEY, CALIFORNIA

GRA-3–Concrete-Lined Canal

This alternative would convey water from the southwest corner of Thermalito Afterbay (corner of Highway 99 and Hamilton Road) through a 61,600-foot concrete-lined canal to the northeast corner (Liberty Road and Pennington Road) of Gray Lodge WA. A pump station would be required to lift the design flow of 150 cfs into Gray Lodge WA. Water losses through seepage and evaporation in the concrete-lined canal were assumed to be 5 percent. In addition, this alternative assumes that a long-term wheeling agreement will be in place. Facilities required for this alternative are presented in Table III-7.

GRA-9–Improvements To Existing Facilities

From mid-April through mid-December, this alternative would convey water from the southern end of Thermalito Afterbay, through the A-Joint Canal, through BWGWD's existing unlined canals to four existing delivery points to Gray Lodge WA. The 9,000-foot-long A-Joint is owned, operated, and maintained by the Joint Water District Board. A flow rate of 181 cfs would have to be diverted through the A-Joint Canal to deliver 150 cfs to Gray Lodge WA.

To ensure an adequate supply of water to Gray Lodge WA during this time period, there are two facility improvements that are required to increase capacity of the system during peakmaximum delivery. About a mile downstream of the intersection of the A-Joint Canal and the Main Canal an existing BWGWD siphon needs to be removed and replaced. The siphon consists of concrete headwalls and a concrete drainage ditch flume with two siphon pipes (one corrugated metal pipe (CMP) and one concrete) that takes the Main Canal flow beneath the drainage ditch flume. The drainage ditch flow is contained in a 54-inch-diameter CMP as it passes under the BWGWD maintenance roads on both sides of the canal. The siphon needs to be pulled out leaving the Main Canal whole, and the drainage ditch should be siphoned under the Main Canal.

The Garcia Siphon, similar to the Razorback Siphon, needs to be removed and replaced. The Garcia Siphon is located on the Main Canal about 1.5 miles downstream of the Razorback Siphon.

On the Traynor Lateral two structures need to be removed and replaced, the Nugent Flume and the Colusa Highway culvert. Both structures have flow capacity restrictions that may need to be enlarged.

The last 1.5 miles of the Cassidy Lateral, prior to Gray Lodge WA, is a private ditch, although BWGWD has conveyance rights. The ditch is poorly maintained by the farmer and needs to be rechannelized and cleaned out. BWGWD could put a lock gate on the farmer's turnout to better ensure Gray Lodge WA delivery.

From mid-January through mid-April, when BWGWD's facilities are out of service for annual maintenance, this alternative would provide 22 cfs (5,300 ac-ft) from Gray Lodge WA's existing 21 groundwater wells. Most of the deep wells were installed in the 1950s and will need to be rehabilitated in the near future. The cost of rehabilitating these wells has not been included in the report. Reclamation project power does not seem to be viable for the wells because the electrical power poles/ wires on the refuge belong to PG&E and PG&E will still charge transmission fees.

Conveyance losses through the BWGWD facilities are estimated at 17 percent. In addition, this alternative assumes that a long-term wheeling agreement will be in place. Facilities required for this alternative are presented in Table III-8.

Table III-6
Proposed Facilities For Alternative GRA-1

Item	Description
1	Turnout at Thermalito Afterbay • Design Flow: 150 cfs
2	Gravity Pipeline • Length: 61,600 lin ft • Diameter: 72 in • Design Flow: 150 cfs
3	Pipeline Crossings–Bore-and-Jack • Highway 99
4	Pipeline Crossings–Trenching • Riceton Highway • Main drainage canal • Three farm laterals and local roads • Three crossings of Ashley Lateral • Belding Lateral

Table III-7
Proposed Facilities For Alternative GRA-3

Item	Description
1	Turnout Thermalito Afterbay • Design flow: 155 cfs
2	Concrete-Lined Canal • Length: 61,600 lin ft • Bottom width: 6 ft • Top width: 21 ft • Design flow: 155 cfs
3	Pump Station • Total dynamic head: 20 ft • Design flow: 150 cfs • Horsepower: 450
4	Canal Crossings at: • Highway 99 • Main drainage canal • Three crossings of farm laterals and local roads • Three crossings of Ashley Lateral • Riceton Highway • Belding Lateral

Table III-8 Proposed Facilities For Alternative GRA-9	
Item	**Description**
1	Improvements to Belding Canal (Razorback Siphon and Garcia Siphon) • Remove existing canal siphon at each location • Construct new under-drain siphon–two 48-inch siphons at each location • Construct new canal section at each location
2	Improvements to Traynor Lateral • Remove and replace Nugent Flume • Remove and replace Colusa Highway Culvert
3	Improve Cassidy Lateral

GRA-14-Improvements To Existing Facilities

This alternative is a combination of GRA-9 (Gray Lodge WA groundwater wells and BWGWD facilities) and Butte Water District (BWD) facilities to provide Level 4 water.

From mid-January through mid-April, when BWD and BWGWD's facilities are out of service for annual maintenance, this alternative would provide 22 cfs from Gray Lodge WA's existing 21 groundwater wells. Most of the deep wells were installed in the 1950s and will need to be rehabilitated in the near future. Reclamation project power does not seem to be viable for the wells because all of the electrical power poles/wires on the refuge belong to PG&E and PG&E will still charge transmission fees.

From mid-April through mid-January, this alternative would convey water from the southern end of Thermalito Afterbay, through the A-Joint Canal, and then either through BWGWD's existing unlined canals to four existing delivery points to Gray Lodge WA or through the Main Canal and BWD facilities to Gray Lodge WA. The A-Joint Canal and Main Canal are owned, operated, and maintained by the Joint Water District Board. A flow rate of 180 cfs would have to be diverted through the A-Joint and Main Canals to deliver 150 cfs to Gray Lodge WA.

Water losses through seepage and evaporation in the existing earth-lined canal were assumed to be 17 percent. In addition, this alternative assumes that a long-term wheeling agreement will be in place. Facilities required for this alternative are presented in Table III-9.

Mitigation Included in the Alternatives

The following Summary of Project Impacts and Mitigation Measures table summarizes all anticipated impacts and recommended mitigation for the construction of the conveyance alternatives to each refuge area. As indicated in the table, implementation of the recommended mitigation will result in all impacts being less than significant.

Alternatives Considered But Eliminated From Detailed Study

As described previously in the Screening Criteria section, Reclamation investigated a number of alternatives capable of delivering additional water supplies to each of the refuges. These alternatives are presented in

Tables III-1 and III-8, with a brief representation of the selected criteria. Alternatives that were determined to be infeasible based on the screening criteria included variations of the selected alternatives, and incorporated pipelines, canals, pump stations, and other facilities. A full account of the selection process and identification of eliminated alternatives is available in the April 1995 Decision Document *Report of Recommended Alternatives Refuge Water Supply and San Joaquin Basin Action Plan Lands.*

Summary of Project Impacts and Mitigation Measures

Impact		Mitigation		Level of Significance After Mitigation
Land Use				
LU-a	Alternatives SUT-8, SUT-9, SUT-10, GRA-1, and GRA-3 could temporarily impact between 140 to 270 agricultural production acres for one season.	LU-1 LU-2 LU-3	Schedule construction to minimize impacts to crop production. Minimize work space required to install facilities. Compensate landowners for loss of crop production.	LS
LU-b	Alternatives SUT-8, SUT-9, SUT-10, GRA-1, and GRA-3 could permanently impact residential and other structures.	LU-4	Route conveyance facilities so as to avoid residences and other structures. Ensure access to all residences during construction, and limit construction hours from 8:00 a.m. to 5:00 p.m. during weekdays or as agreed to by homeowners.	LS
LU-c	Alternatives SUT-8, SUT-9, and GRA-9 could temporarily impact high-tension lines with respect to safety during construction	LU-5	Implement standard Occupational Safety and Health (OSHA) construction practices.	LS
LU-d	Alternatives SUT-10, GRA-1, and GRA-3 could temporarily impact residential powerlines.	LU-6	Route conveyance facilities so as to avoid powerlines by placing such facilities within existing roads.	LS
Biological Resources				
BR-a	Alternatives SUT-8, SUT-9, GRA-1, BRA-3, GRA-9, and GRA-14 could impact listed plants.	BR-1	Conduct pre-construction surveys prior to final design to identify locations of special-status plants. Surveys must be timed to coincide with the flowering seasons of the targeted species. Following pre-construction surveys, avoid impacts to special-status plants by through facility routing.	LS

Notes:

LU = Land Use

BR = Biological Resources

LS = Less than Significant

Summary of Project Impacts and Mitigation Measures		
Impact	**Mitigation**	**Level of Significance After Mitigation**
Biological Resources		
BR-a (continued)	BR-2 Where avoidance of special-status plants is not practicable, develop and implement measures for mitigating impacts, including relocation or reestablishment of special-status plant populations. Mitigation would involve creating suitable habitat in non-suitable habitat by providing soil, water, and vegetation to replicate conditions needed to establish special-status species populations.	
BR-b Alternatives SUT-8, SUT-9, SUT-10, and GRA-14 could impact between 0.49 to 6 acres of riparian habitat.	BR-3 Prior to final design, map and quantify riparian habitat and other important natural plant communities. Develop measures to avoid or minimize impacts to these habitats. BR-4 Develop and implement mitigation measures for unavoidable impacts to riparian habitat. Where possible, disturbed riparian habitat should be restored onsite following completion of construction activities. Permanently eliminated riparian habitat should be replaced at a 2:1 ratio (i.e., 2 acres of habitat created for each acre eliminated). Mitigation would involve creating riparian habitat in non-riparian habitat by providing soil, water, and vegetation. BR-5 Develop and implement a revegetation plan for temporarily disturbed construction sites. The revegetation plan should incorporate seeding and planting of species that will resist invasion by noxious weeds. BR-6 Develop and implement a monitoring plan to assess the success of mitigation measures for impacts to vegetation and special-status species. All plantings on the revegetation and compensation sites should be monitored during the growing season (March through September) to determine growth rates for 3 years from the date of transplant or planting. A yearly report including dates of watering, growth rates, cover rates, and mortality figures should be submitted to the U.S. Fish and Wildlife Service (Service). Monitoring could be curtailed after 3 years if success is demonstrated (plant cover of the mitigation site is at least 80 percent of the cover at the impact site prior to project disturbance and vegetative composition of the dominant (> 20 percent of the cover) and characteristic species (typical, regularly occurring in the habitat but	LS

Notes:
BR = Biological Resources
LS = Less than Significant

Summary of Project Impacts and Mitigation Measures			
Impact		**Mitigation**	**Level of Significance After Mitigation**
Biological Resources			
BR-b (continued)		not dominant) exceeds 80 percent of what was present at the impact site. Monitoring of special-status plant mitigation sites could be curtailed after 3 years if overall survival rates of seeded, planted, or transplanted plants exceed 80 percent of projected survival rates. BR-18 Obtain a streambed alteration agreement with the California Department of Fish and Game (Department), pursuant to Section 1601 of the Fish and Game Code, before initiating construction within the 100-year floodplain of any stream crossing.	LS
BR-c	Alternatives SUT-8, SUT-10, GRA-1, GRA-3, GRA-9, GRA-14 could impact habitat used by Swainson's hawk during the critical nesting period.	BR-7 Conduct pre-construction surveys for raptors (including Swainson's hawk) prior to the peak March-through-August nesting period. Construction during the critical nesting period (March through August) will be avoided, OR if nesting pairs and fledglings are identified within 0.25 miles of construction, a monitoring program will be initiated in consultation with the Department.	LS
BR-d	Alternatives SUT-10 and GRA-14 could impact areas combining elderberry shrubs.	BR-8 Conduct pre-construction surveys for presence of Valley Elderberry Longhorn Beetle (VELB) and elderberry bushes prior to initiation of construction. During final design, re-align linear facilities outside of VELB habitat. Where VELB habitat cannot be avoided, buffer zones will be established around elderberry shrubs. BR-9 If impacts to individual elderberry shrubs cannot be avoided, (1) shrubs should be trimmed instead of removed whenever possible, and (2) removed shrubs with stems greater than 1.0 inches in diameter should be transplanted.	LS
BR-e	Alternatives SUT-8, SUT-10, GRA-1, GRA-3, GRA-9, GRA-14 could impact habitat used by giant garter snake.	BR-10 Conduct pre-construction surveys for GGS. Surveys should be conducted between April 15 and June 1 by a qualified biologist. During final design, avoid all habitat features to the extent possible that contain GGS or provide suitable habitat for giant garter snake (GGS).	LS

Notes:
BR = Biological Resources
LS = Less than Significant

Summary of Project Impacts and Mitigation Measures		
Impact	**Mitigation**	**Level of Significance After Mitigation**
Biological Resources		
BR-e (continued)	BR-11 If impacts to GGS habitat cannot be avoided, employ mitigation measures to avoid direct impacts to snakes. No grading, excavating, or filling will take place within 30 feet of GGS habitat between October 1 and May 1. To ensure avoidance of impacts to individual snakes, a trained monitor will be present onsite to remove snakes prior to construction if individual snakes are found to be present. BR-14 Develop and implement a monitoring plan to assess the success of mitigation measures for impacts to special-status wildlife. Success criteria shall be clearly defined for all measures implemented to mitigate for project impacts to wildlife. Yearly reports should be submitted to the Service and the Department. If success criteria are being met after 3 years of monitoring, no additional monitoring is necessary.	LS
BR-f Alternatives SUT-8, SUT-10, GRA-1, GRA-3, GRA-9, GRA-14 could impact between 0.1 to 2.12 acres of jurisdictional wetlands.	BR-15 Conduct pre-construction delineations of wetlands and other waters of the United States. Request a verification of the delineated boundaries from the U.S. Army Corps of Engineers (COE). Following verification of the delineation boundaries, develop measures to avoid impacts to jurisdictional wetlands. BR-16 After final design, quantify impacts to wetlands and other waters. Submit to COE a permit application for discharge of fill material into waters of the United States, pursuant to Section 404 of the Clean Water Act. BR-17 Install and maintain appropriate erosion and sedimentation controls during and following construction as specified in the required Erosion Control Plan (see Hydrology and Water Quality section). BR-19 Develop and implement mitigation plans for impacts to wetlands. Replace eliminated wetlands at a 2:1 ratio. Temporarily impacted wetlands should be restored onsite. Stockpile topsoil removed from wetlands and store in upland landscape positions. Following construction disturbance, restore the land surface contours and backfill the top 6 to 12 inches with stockpiled topsoil.	LS

Notes:

BR = Biological Resources

LS = Less than Significant

Summary of Project Impacts and Mitigation Measures			
Impact		**Mitigation**	**Level of Significance After Mitigation**
Biological Resources			
BR-f (continued)		BR-20 Following project completion, monitor the site to assess mitigation success. Success criteria should be clearly defined for all measures implemented to mitigate for project impacts to wetlands. Yearly reports should be submitted to the Service and COE until implementation has been determined to be successful.	LS
Cultural Resources			
CR-b	Alternatives SUT-8 and SUT-9 could impact the Sacramento Northern Railroad bridge crossing of the Wadsworth Canal adjacent to the SUT-8/SUT-9 alignments.	CR-2 Route conveyance facilities to avoid cultural resource CA-BUT-326	LS
CR-c	Alternative GRA-14 could impact historic structure.	CR-3 Route conveyance facilities to avoid the historic structure.	LS
Hydrology and Water Quality			
HWQ-a	Alternatives SUT-8 and SUT-9 would temporarily disturb streambeds.	HWQ-1 Schedule construction within the banks of all streams during the dry season when these channels have reduced flows. HWQ-2 Develop and implement an erosion control and restoration plan that identifies methos to minimize sedimentation during construction. HWQ-3 Bore under East Borrow Ditch.	LS
Recreation			
		No mitigation is required.	
Socioeconomics			
		No mitigation is required.	
Energy			
		No mitigation is required.	
Air Quality			
		No mitigation is required.	

Notes:

CR = *Cultural Resources*
HWQ = *Hydrology and Water Quality*
S = *Significant*
LS = *Less than Significant*
SV = *Significant, Unavoidable*

Table III-9
Proposed Facilities For Alternative GRA-14

Item	Description
1	Turnout Thermalito Afterbay • Design flow: 180 cfs
2	Main Canal Improvements • Looney Automatic Head Gates • Holmes Wier
3	Enlargement of Chandon Lateral (BWD) • Design flow: 150 cfs (Ag Flows and Gray Lodge WA Flows) • Turnout at Main Canal
4	Chandon Lateral Crossing Improvements • Drain Crossing 1/2 mile west of turnout • Chandon Avenue • Larkin • Abandoned railroad • Drain Crossing • Highway 99 siphon • Railroad siphon west side of Highway 99 • Riverier • Township Road
5	Drainage Ditch Improvements • Jensen Ditch • New Ditch • Snake River Wier
6	Pressure Pipeline • Length: 8,400 ft • Diameter: 54-inch • Design flow: 105 cfs
7	Pump Station • Total dynamic head: 40 ft • Design flow: 105 cfs • Horsepower: 680
8	Outlet Structure at Refuge Distribution Canal • Design flow: 105 cfs

Chapter IV
Affected Environment and Environmental Consequences

This chapter describes the environmental conditions which may be affected by the construction of any of the conveyance alternatives for the two refuge areas, as well as the anticipated impacts of this construction. All mitigation is incorporated into each of the alternatives. The criteria for determining significance are presented for each issue area and are based on guidance from the NEPA Regulations and CEQA Guidelines, as well as professional judgment. The following issue areas were determined to warrant analysis through the scoping process:

- Land Use
- Biological Resources
- Cultural Resources
- Hydrology/Water Quality
- Recreation
- Socioeconomics
- Energy
- Air Quality

Other issues typically discussed in a NEPA/CEQA document such as geology, aesthetics, and public health and safety are either discussed in this document as part of other issue area analyses or, in the case of geology, determined to be unaffected by the proposed action.

Typical Construction and Operations/Maintenance Impacts

Construction impacts would vary for each of the conveyance alternatives depending on the type of facility used to convey water. Alternatives that incorporate new conveyance facilities would typically involve some degree of clearing, excavation, and grading along a linear corridor. Impacts associated with turn-out structures, siphons, weirs, or pumps would be limited and site-specific in nature. Impacts resulting from operations and maintenance (O&M) would also depend on the facility constructed. The typical impacts associated with the various facilities required among the alternatives are described in the following sections. The particular facilities proposed for each alternative are presented in Table IV-1. Figures IV-1 and IV-2 illustrate the areas of construction associated with each alternative by refuge.

Pipeline

Impacts for the construction of an underground pipeline would be limited to the short term because vegetation, other than large trees, would be either reseeded or allowed to naturally reestablish within the impacted area. The anticipated width of impact for installation of a pipeline ranges from approximately 150 to 200 feet. Clearing and grading would typically be limited because of the flat terrain and absence of trees. Crossings of large creeks, canals, and roads would likely be accomplished by boring or installing siphons. Although this technique requires excavation on either side of the feature and subsequently a greater right-of-way width than the open-cut method, impacts to stream habitats, road and rail traffic, and water conveyance would be minimized. Crossings of minor roads and creeks and canals would be installed by open trenching across the feature. Installation of a pipeline within a roadway would require pavement cutting if the road were paved or simply trenching if the road were unpaved. No clearing would be required.

Impacts from O&M would be limited to the unlikely need to repair the pipeline or remove a large tree from the right-of-way.

Table IV-1
Construction and Operations and Maintenance Impacts For Proposed Facilities

Alternative	Pipeline (distance in feet)	Pump	New Canal (distance in feet)	Widen Existing Canal	Turnout Structure, Siphon, and/or Weir
Sutter NWR					
SUT-8	● (32,000)				●
SUT-9	● (32,000)	●			●
SUT-10					●
Gray Lodge WA					
GRA-1	● (61,600)				●
GRA-3		●	● (61,600)		●
GRA-9		●			●
GRA-14	● (8,400)	●	● (2,200)	● (34,900)	●

Pump

The installation of pumps to lift water from one conveyance facility to another would temporarily impact no more than approximately 0.25 acre. Impacts associated with O&M would be limited to periodic inspections and repair as necessary.

New Canal

Impacts associated with an open-surface canal would occur in both the short and long term because preexisting uses would be permanently removed. The anticipated width of impact during construction is expected to range from 150 to 200 feet. An approximately 100-foot-wide area of permanent impact is anticipated for the construction of an open channel. Construction activities associated with the canal would include grading and excavation, as well as construction of a permanent service road and fencing.

Impacts associated with O&M would include yearly cleaning and maintenance of a cleared strip along either side of the canal.

Turnout Structure Or Weir

New turnout structures or the enlargement of existing structures on streams and canals designated as water sources are required as part of many of the alternatives. The size and type of these structures will vary depending on the alternative, but would likely impact a small area (less than one acre) adjacent to the water source.

Impacts associated with O&M would include the potential for entrainment of fish, if fish are present within the source watercourse, in addition to the unlikely need to repair a structure resulting in potential impacts to water quality of the watercourse. Impacts to anadromous fisheries are expected to be insignificant because of the lack of fish resources in most facilities, in addition to fishery protection measures taken at the two river diversions at Red Bluff and Hamilton City.

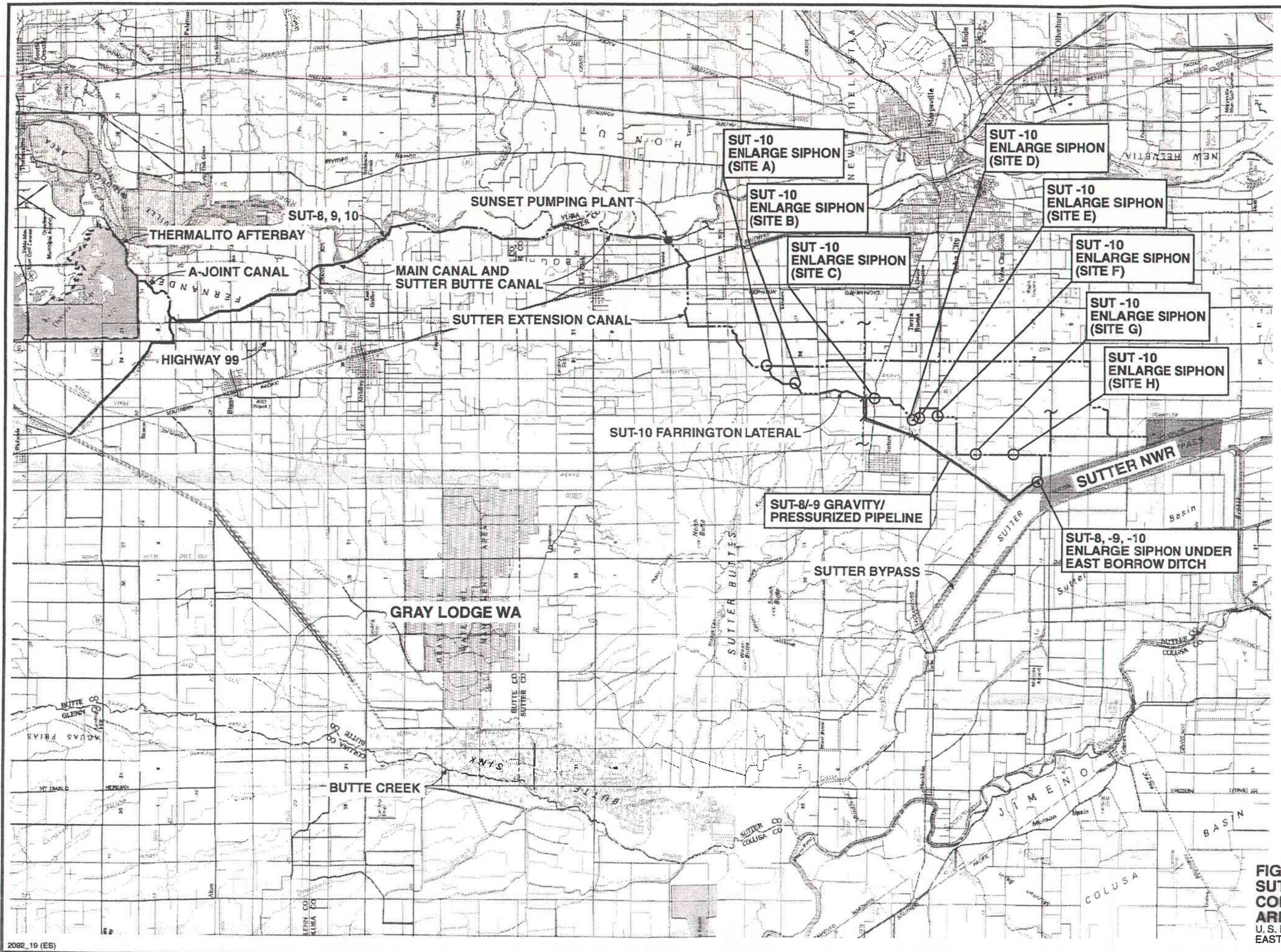

FIGURE IV-1
SUTTER NWR CONSTRUCTION AREAS BY ALTERNATIVE
U. S. BUREAU OF RECLAMATION
EAST SACRAMENTO VALLEY, CALIFORNIA

2092_19 (ES)

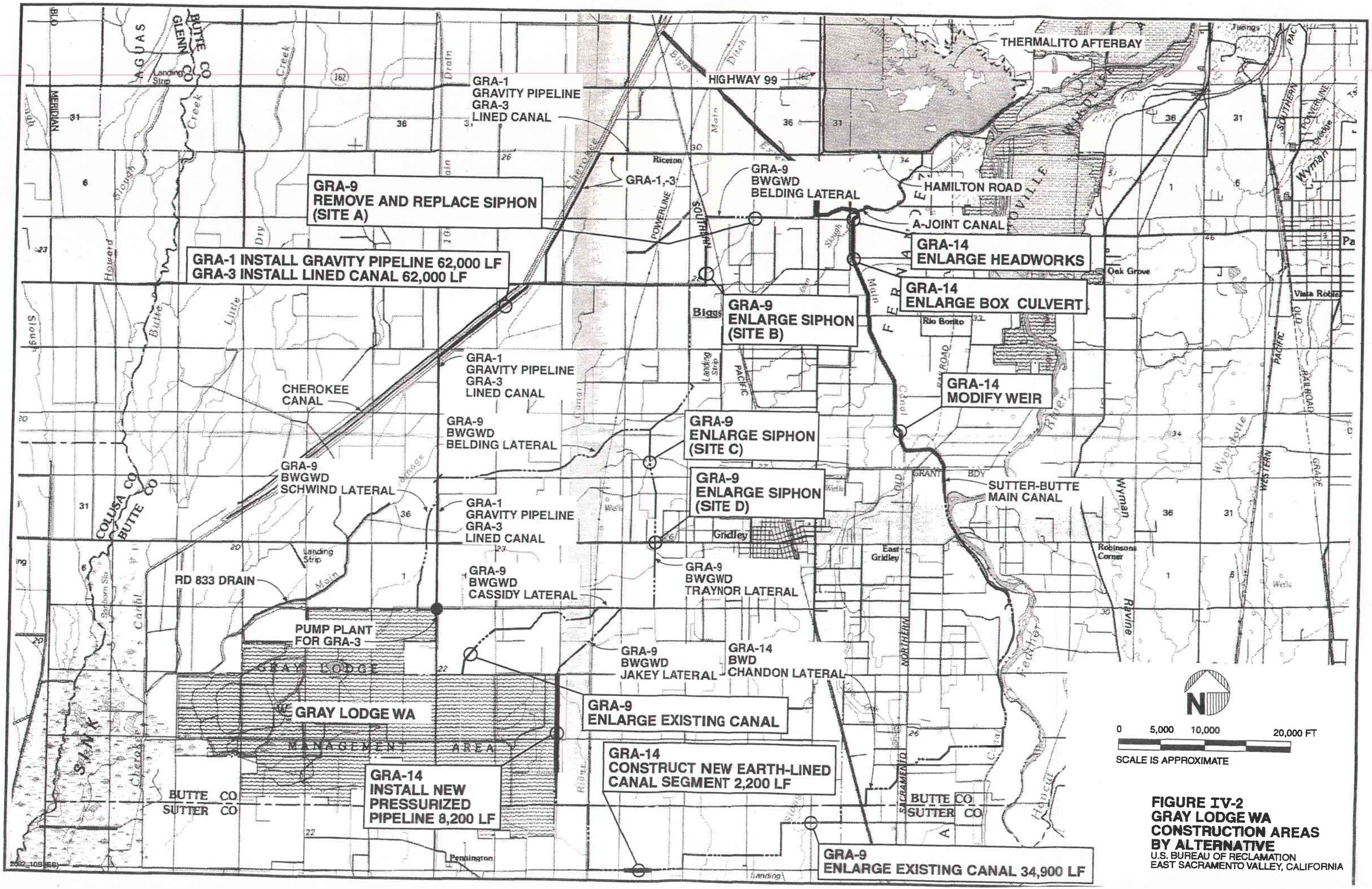

FIGURE IV-2
GRAY LODGE WA
CONSTRUCTION AREAS
BY ALTERNATIVE
U.S. BUREAU OF RECLAMATION
EAST SACRAMENTO VALLEY, CALIFORNIA

East Sacramento Valley Study Area Affected Environment

Two areas were created to provide habitat for migratory waterfowl within the study area: Sutter NWR and Gray Lodge WA. Sutter NWR is considered a part of the Sacramento Complex, which is managed by the Service and served by SEWD. The Gray Lodge WA is managed by the Department and served by BWGWD. SEWD obtains its water from the Feather River using SWP facilities through existing agreements. Water is subsequently conveyed through existing canals and streams. The Sutter NWR receives the majority of its winter supply from storm flows from the Sutter Bypass, given its location within the bypass, as well as from agricultural return flows. The primary source of water for BWGWD is ultimately Thermalito Afterbay, which is a part of the SWP. The Gray Lodge WA receives no supplies from BWGWD from mid-January to mid-April when BWGWD facilities are dewatered for maintenance.

Land Use

Affected Environment

This study area encompasses a relatively flat terrain that is traversed by a number of irrigation canals and creeks. The primary land use within the study area is agricultural, consisting mainly of orchard and field crops. Principal crops include rice, alfalfa hay, prunes, and walnuts. Rural residences, most of which are associated with agricultural holdings and operations, are located throughout the area.

Agricultural. Butte County designates the Gray Lodge WA vicinity A-40, which allows agricultural use with a minimum parcel size of 40 acres (Butte County, 1979).

The majority of land within the Sutter County portion of the study area is designated intensive agriculture (Sutter County, 1983). Most of these lands are flood irrigated for the production of rice. Lands adjacent to the Feather River and Butte Creek/Slough (including Butte Sink and the Sutter Bypass) are designated key wildlife habitat.

The planting and/or harvesting schedules for rice, hay, and orchard crops typically include March through April and August through October.

Residential/Structural. Isolated structures and groups of structures, associated with farming operations or residences (e.g., farmsteads), are located along local roads throughout the study area. Areas of note are: two farmsteads east of the East Borrow Ditch (SUT-8 and SUT-9), and scattered residences along the SUT-10 alignment.

Infrastructure. Residential powerlines are located along local roads throughout the study area. High-tension lines, running north-south, bisect the study area just east of Gray Lodge WA and west of Sutter NWR.

Environmental Consequences

Criteria for Determining Significance. Impacts to existing land use would be considered significant if they would result in any one of the following:

- Conflicts with adopted environmental plans and goals of the community (e.g., General/ Specific Plan) where the project is located
- Conversion of prime agricultural land to non-agricultural use
- Impairment of the agricultural productivity of prime agricultural land

Land use impacts and mitigation measures are summarized in Table IV-2.

Table IV-2
Land Use Impacts and Mitigation Measures

Impact	Mitigation	Level of Significance
LU-a Alignments SUT-8, SUT-9, SUT-10, GRA-1, and GRA-3 could temporarily impact between 140 to 270 agricultural production acres for one season.	LU-1 Schedule construction to minimize impacts to crop production. LU-2 Minimize work space required to install facilities. LU-3 Compensate landowners for loss of crop production.	LS
LU-b Alignments SUT-8, SUT-9, SUT-10, GRA-1, and GRA-3 could permanently impact residential and other structures.	LU-4 Route conveyance facilities so as to avoid residences and other structures. Ensure access to all residences during construction, and limit construction hours from 8:00 a.m. to 5:00 p.m. during weekdays or as agreed to by homeowners.	LS
LU-c Alignments SUT-8, SUT-9, and GRA-9 could temporarily impact high-tension lines with respect to safety during construction.	LU-5 Implement standard OSHA construction practices.	LS
LU-d Alignments SUT-10, GRA-1, and GRA-3 could temporarily impact residential powerlines.	LU-6 Route conveyance facilities so as to avoid powerlines by placing such facilities within existing roads.	LS
LS = Less than significant		

Agricultural. Given that the majority of lands are used for agricultural purposes, land use impacts in the East Sacramento Valley study area would include temporary loss of production of as many as 283 acres and inconvenience to farming operations. All alternatives would impact agricultural operations and crop production in the short term, depending on the time of year construction is scheduled. The magnitude of this disturbance would be greatest for GRA-3, which is the one alternative in the study area that involves constructing a new canal. Installation of this canal would result in the significant long-term impact of permanently removing approximately 140 acres of agricultural land from production within the canal right-of-way. GRA-14 involves constructing a 2,200-foot segment of a canal which would result in the significant long-term impact of permanently removing approximately 5 acres of agricultural land from production within the canal right-of-way.

The alternatives that involve construction of new pipeline facilities (SUT-8, SUT-9, GRA-1, and GRA-14) would impose only a short-term (one season) impact on crop production and operations. Although production would be expected to fully recover within 1 to 3 years, this would nonetheless be a significant impact. Land disturbance could also result in the spread of noxious weeds.

Impacts By Alternative.

- SUT-8. The installation of 32,000 feet of gravity pipeline would temporarily disturb an approximately 200-foot-wide, 153-acre swath. This disturbance would temporarily impact agricultural operations for approximately one growing season.

- SUT-9. The installation of 32,000 feet of pressurized pipeline follows the same alignment described for SUT-8 and would

have the same temporary disturbance to 153 acres.

- SUT-10. Localized improvements to the existing Farrington Lateral include excavation of 3 to 6 feet along one side of the Farrington Lateral. This disturbance would temporarily impact agricultural operations for approximately one growing season.

- GRA-1. This alternative requires the installation of a pipeline in local roads and open farm fields. The pipeline alignment runs along West Hamilton Road between Highway 99 and Riceton Highway for 10,560 linear feet; along Afton Road just east of the Cherokee Canal for 3,280 linear feet; and along Pennington Road between Colusa Highway and West Liberty Road for 5,280 linear feet. The remaining 42,480 linear feet of pipeline would cut across open rice fields.

  The temporary loss of agricultural production associated with this 11.5-mile corridor corresponds to approximately 272 acres.

- GRA-3. Installation of a new canal would temporarily disturb a continuous, 200-foot-wide swath of agricultural land approximately 61,600 feet long and would result in a 100-foot-wide, 140-acre permanently impacted area, the length of the alignment.

  Localized areas of disturbance include the same areas impacted by GRA-1, in addition to the Belding Lateral at Liberty Road, and installation of a pump station at the refuge boundary.

- GRA-9. Improvements to existing BWGWD facilities would create five areas of localized disturbance. No significant disturbance to crops would occur.

- GRA-14. Installation of a new canal segment would temporarily disturb a continuous, 200-foot-wide swath of agricultural land approximately 2,200 feet long and would result in a 100-foot-wide, 5-acre permanently impacted area.

Residential/Structural. Permanent residences and/or outbuildings are located within, or directly adjacent to, the 200-foot-wide pipeline corridor. Impacts to buildings located within the corridor would be permanent; impacts to buildings and their occupants adjacent to the corridor would be temporary and limited to the construction period. Such impacts would be considered significant.

Impacts By Alternative.

- SUT-8. Two farmsteads are located east of the East Borrow Ditch.

- SUT-9. Same as Alternative SUT-8.

- SUT-10. Enlargement of the Farrington Lateral could impact a residence at the north end of the cutting horse ranch located at the southwest corner of East Butte Road and Ahlf Road.

- GRA-1. One house and a barn located approximately 300 feet west of Pennington Road, south of the Colusa Highway, and three mobile homes located approximately 20 to 50 feet east of Pennington Road, in the same general vicinity, would be impacted.

- GRA-3. Same as Alternative GRA-1.

- GRA-9. No structures present.

- GRA-14. No structures present.

Infrastructure. Powerlines and roadways may be affected by the proposed alternatives, primarily in terms of inconvenience of access, interruption of service, and general disturbance.

Impacts to roadways would be temporary and limited to the construction period. Impacts to powerlines can be mitigated by selective routing.

Impacts By Alternative.

- SUT-8. A high-tension line installed along the east side of the East Bank Levee may impose potential safety concerns. Implementation of standard Occupational Safety and Health Administration (OSHA) construction practices would result in a less than significant impact.

- SUT-9. Same as Alternative SUT-8.

- SUT-10. Enlargement of Farrington Lateral may impact a residential powerline installed on the west side of Clements Road.

- GRA-1. Residential powerlines exist along the west side of Pennington Road.

- GRA-3. Same as Alternative GRA-1.

- GRA-9. Occasional localized disturbance associated with improvements to BWGWD facilities would not impact residential powerlines in the vicinity of the area where the work would be performed.

  Enlargement of the Cassidy Lateral would occur adjacent to a pair of high-tension lines running approximately north-south, one-half mile east of the refuge boundary. Operation of construction equipment in the vicinity of these lines could result in increased safety hazards to equipment operators and other construction workers, as well as damage to the particular facility. Implementation of standard OSHA construction practices would result in a less than significant impact.

- GRA-14. Enlargement of Chandon Lateral may impact residential powerlines installed on the north side of Chandon Avenue and on the east side of Krehe Road.

Mitigation

The following mitigation measures are incorporated into each alternative (labeled LU for Land Use) and will reduce the impacts identified above to a less than significant level:

- LU-1. Route conveyance facilities so as to avoid residences, structures, and powerlines.

- LU-2. Schedule construction to minimize impacts to crop production and operations, or compensate landowners for any loss of crop production.

- LU-3. Minimize work space required to install facilities to lessen impacts to available cropland and decrease potential for spread of noxious weeds.

- LU-4. Ensure access to all residences during construction, and limit construction hours to 8:00 a.m. to 5:00 p.m. during weekdays, or as agreed to by homeowners.

Biological Resources

This section discusses the existing biological setting and anticipated impacts to biological resources in the study area. Guidance for the preparation of this section was provided, in part, by the Service through joint initial site evaluation field meetings conducted on November 9 and 10, 1994 for Sutter NWR and Gray Lodge WA. Subsequent surveys were conducted in the fall of 1995, and September 1996. In addition, the Service provided species lists and suggested surveys be conducted to determine the potential effects of the action on federally listed, proposed, and species of concern or their habitat. Information and guidance was also provided from the Department of Fish and Game in 1994. The Service's Endangered Species Division provided further guidance in April 1996.

This section also summarizes on-refuge benefits related to additional habitat associated with

providing additional water supplies. These benefits would be identical for each alternative, as all alternatives would convey water supplies up to the Level 4 quantity, which will in turn be used to enhance and provide additional habitat.

Affected Environment

Vegetation. Vegetation in the vicinity of the two refuges has been strongly influenced by agricultural conversion and associated water diversions. Currently, the vast majority of these areas are intensively managed as farmland. The most prevalent agricultural practice in the study area is rice farming; row crops and alfalfa are also common. Unfarmed land is primarily used for grazing.

Prior to agricultural conversion, the study area was a vast complex of marshes, riparian forests, valley grasslands, and alkali sinks. Under existing conditions, only remnant examples of these plant communities occur, primarily in isolated or fragmented patches. As a result of agricultural conversion and other landscape alterations, plant species in areas where these native habitats still occur have also become isolated, influenced by exotic species, and in some cases, extirpated. The refuge areas themselves are the primary source of habitat for waterfowl, in addition to adjacent private wetlands and harvested rice fields.

Plant communities within the alternative corridors and impact areas were classified according to the habitats defined in the California Native Plant Society's (CNPS's) *Inventory of Rare and Endangered Plants of California* (Skinner and Pavlik, 1994). CNPS habitats observed in the study area include chenopod scrub, valley and foothill grassland, marshes and swamps, riparian forest, riparian woodland, and riparian scrub.

Special-Status Species. Special-status plant species are vascular plants that are (1) designated as rare, threatened, or endangered by the state or federal governments; or (2) are proposed for rare, threatened, or endangered status; and/or (3) are state or federal candidate species; and/or (4) are included on the CNPS Lists 1A, 1B, and 2 (Skinner and Pavlik, 1994).

Special-status plant species that potentially occur in the anticipated impact areas were determined by (1) reviewing the most current lists of special-status plants (Service, 1995a, 1995b; Federal Register, 1995c, 1996); (2) conducting literature review and searches of the Service's *Natural Diversity Database* (NDDB) and the CNPS *Electronic Inventory* (CNPS Inventory); (3) reviewing species lists provided by the Service (Service, 1995); and (4) conducting reconnaissance-level habitat evaluations for each alternative.

Field evaluations were conducted in the fall of 1995 and September of 1996 and consisted of driving and walking proposed corridors and improvement sites to determine potential occurrences of special-status plant species. These determinations were based on the types and conditions of existing habitats within the proposed corridors and improvement sites. Field notes were recorded describing plant communities within the proposed corridors and improvements sites. These notes describe vegetation, locations of sensitive resource areas where special-status plants are most likely to occur (e.g., alkali scrub), and observed locations of special-status plants.

Table IV-3 displays the special-status plant species that could potentially occur in the study area. These special-status plant species occur in five CNPS-defined habitat types: (1) valley and foothill grassland, (2) chenopod scrub, (3) vernal pools, (4) cismontane woodland, and (5) marshes and swamps. Of these five habitat types, valley and foothill grassland, and chenopod scrub were observed in the impact areas and alternative corridors.

Wildlife. The East Sacramento region is also a key area for migratory species of the Pacific Flyway, attracting large numbers of ducks, geese, and shorebirds during the fall and winter months. Many resident and migratory wildlife

species occur within the East Sacramento Region. Resident species include numerous amphibians and reptiles, large and small mammals, and various shorebirds, waterfowl, raptors, and songbirds.Wildlife habitats present in the study area were characterized according to *A Guide to the Wildlife Habitats of California* (Mayer and Laudenslayer, 1988). Wildlife habitats occurring within the proposed project sites or corridors include valley-foothill riparian, annual grassland, fresh emergent wetland, pasture, riverine, and cropland.

Special-Status Species. For the purposes of this evaluation, special-status wildlife species include taxa that are (1) designated as threatened or endangered by the state or federal governments (i.e., "listed species"); or (2) are proposed or petitioned for federal threatened or endangered status; and/or (3) are state or federal candidates for threatened or endangered status; and/or (4) are identified by the Service as "Species of Special Concern."

Potential presence of special-status wildlife species within the study area was determined by (1) reviewing the most current lists of special-status wildlife species (Service, 1995a, 1995c; Federal Register, 1996); (2) conducting literature review and record searches of the NDDB; (3) reviewing species lists provided by the Service (1995); and (4) conducting field surveys as discussed below.

Field evaluations were undertaken in fall of 1995 and September of 1996 and consisted of driving and walking proposed corridors and improvement sites to determine potential occurrences of special-status wildlife species. These determinations were based on the types and conditions of existing wildlife habitats within the proposed corridors and improvement sites. Field notes were recorded describing wildlife habitats within the proposed corridors and improvement sites. These notes describe habitats, locations of habitat elements where special-status wildlife species are most likely to occur (e.g., alkali scrub, riparian woodland), and Wildlife-Habitat Relationship (WHR) plant communities which were delineated on 1:24,000-scale maps.

Table IV-4 displays the special-status wildlife species that could potentially occur in the study area. Of these, three species were determined to be of particular concern based on listing status (i.e., federally and/or state-listed as threatened or endangered) and observations of their habitats within the project corridors and sites. These species are (1) valley elderberry longhorn beetle (VELB), (2) giant garter snake (GGS), and (3) Swainson's hawk. Vernal pools and swales were not observed in the study corridors and sites, but other small ponded depressions may provide habitat for the fairy shrimp and tadpole shrimp species listed in Table IV-4.

Wetlands/Waters. Wetlands are defined for regulatory purposes as "areas that are inundated or saturated by surface water or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adopted for life in saturated soil conditions." Features potentially meeting the required hydric vegetation, hydric soil, and wetland hydrology criteria were observed during the surveys at both refuge study sites. Other waters of the United States that likely do not qualify as wetlands are present at various stream crossings (e.g., Butte Creek crossings of the SUT-8 and SUT-9 alternatives).

The study area contains an extensive network of irrigation canals and ditches. Unlined canals and ditches may support wetland and riparian vegetation, but these features generally do not qualify as jurisdictional wetlands. Similarly, some rice fields and other croplands in the study area are located on former wetlands, but are usually regarded as "prior-converted wetlands" by federal regulatory agencies.

On-Refuge Wetlands/Waters. The Sutter NWR and Gray Lodge WA contain thousands of acres of permanent ponds, seasonal wetlands, irrigated watergrass units, and uplands. These habitat types and particularly

the wetlands support watergrass and invertebrate populations that serve as a foodsource for migratory waterfowl, marsh, and other water birds. Upland areas of the refuge support large concentrations of geese, upland birds, and other wildlife species.

Approximately 2 million ducks and .5 million geese , which represents nearly half of the Pacific Flyway waterfowl total, utilize the refuges of the Sacramento Valley (Service, 1996).

Table IV-3
Potential Special-Status Plant Species
in the East Sacramento Valley Study Area

Scientific Name	Common Name	Habitat[a]	Status[b] Fed/CA/CNPS
Agrostis hendersonii	Henderson's bent grass	VFGrs	SC/-/3
Astragalus rattanii var. *ferrisiae*	Ferris's milk-vetch	VFGrs	SC/-/1B
Atriplex cordulata	Heartscale	ChScr, VFGrs	SC/-/1B
Atriplex depressa	Brittlescale	ChScr, VFGrs	-/-/1B
Balsamorhiza macrolepis var. *macrolepis*	Big-scale balsamroot	CmWld, VFGrs	-/-/1B
Carex vulpinoidea	Fox sedge	MshSw, RpWld	-/-/2
Chamaesyce hooveri	Hoover's spurge	VnPls	FPT/-/1B
Eleocharis quadrangulata	Four-angled spikerush	MshSw	-/-/2
Fritillaria pluriflora	Adobe-lily	CmWld, VFGrs	SC/-/1B
Hibiscus lasiocarpus	Rose-mallow	MshSw	SC/-/2
Juncus leiospermus var. *ahartii*	Ahart's dwarf rush	VnPls	SC/-/1B
Juncus leiospermus var. *leiospermus*	Red Bluff dwarf rush	CmWld, VFGrs	SC/-/1B
Layia serpentrionalis	Colusa layia	CmWld, VFGrs	-/-/1B
Limnanthes flocossa ssp. *californica*	Butte County meadowfoam	VFGrs, VnPls	FE/CE/1B
Limnanthes flocossa ssp. *flocossa*	Wooly meadowfoam	CmWld, VFGrs	SC/-/-
Monardella douglasii ssp. *venosa*	Veiny monardella	VFGrs	SC/-/1B
Myosurus minimus ssp. *apus*	Little mousetail	VnPls	SC/-/3
Orcuttia pilosa	Hairy Orcutt grass	VnPls	FPE/CE/1B
Paronychia ahartii	Ahart's paronychia	CmWld, VFGrs, VnPls	SC/-/1B
Psuedobahia bahiifolia	Hartweg's golden sunburst	CmWld, VFGrs	FPE/CE/1B

Table IV-3
Potential Special-Status Plant Species
in the East Sacramento Valley Study Area

Scientific Name	Common Name	Habitat[a]	Status[b] Fed/CA/CNPS
Sagittari sanfordii	Sanford's arrowhead	MshSw	SC/-/1B
Tuctoria greenei	Green's tuctoria	VnPls	FPE/CR/1B

[a]*Habitat Definitions*

VFGrs *Valley and Foothill Grassland*
ChScr *Chenopod Scrub*
VnPls *Vernal Pools*
CmWld *Cismontane Woodland*
MshSw *Marshes and Swamps*
RpWld *Riparian Woodland*

[b]*Status Definitions:*

Federal

FPT *Federally Proposed as Threatened*
FE *Federal Listed as Endangered*
FPE *Federally Proposed as Endangered Species*
SC *Federal Species of Concern*

State

CE *California Endangered*
CR *California Rare*

CNPS

1B *Considered rare, threatened, or endangered in California and elsewhere.*
2 *Considered rare, threatened, or endangered in California, but more common elsewhere.*
3 *Plants about which more information is needed (The CNPS Review List).*

Table IV-4
Potential Special-Status Wildlife Species
at the East Sacramento Valley Study Area

Scientific Name	Common Name	Status[a] Fed/CA
Invertebrates		
Branchinecta conservatio	Conservancy fairy shrimp	FE/-
Branchinecta lynchi	Vernal pool fairy shrimp	FE/-
Lepidurus packardi	Vernal pool tadpole shrimp	FT/-
Desmocerus californicus dimorphus	Valley elderberry longhorn beetle	FT/-
Fish		
Oncorynchus tsawytscha	Chinook salmon (Spring-run)	PT*/CSC
Amphibians		
Scaphiopus hammondii	Western spadefoot	SC/CSC
Rana aurora draytonni	California red-legged frog	FPE/CSC
Rana boylii	Foothill yellow-legged frog	SC/CSC
Reptiles		
Clemmys marmorata marmorata	Northwestern pond turtle	SC/CSC
Thamnophis gigas	Giant garter snake	FT/CT
Birds		
Plegadis chihi	White-faced ibis	SC/CSC
Branta canadensis leucopareia	Aleutian Canada goose	FT/-
Accipiter cooperi	Cooper's hawk	-/CSC
Accipiter striatus	Sharp-shinned hawk	-/CSC
Aquila chrysaetos	Golden eagle	-/CSC
Buteo regalis	Ferruginous hawk	SC/CSC
Buteo swainsoni	Swainson's hawk	-/CT
Circus cyaneus	Northern harrier	-/CSC
Haliaeetus leucocephalus	Bald eagle	FT/CE
Pandion haliaetus	Osprey	-/CSC
Falco columbarius	Merlin	-/CSC
Falco mexicanus	Prairie falcon	-/CSC
Falco peregrinus anatum	American peregrine falcon	FE/CE

Table IV-4
Potential Special-Status Wildlife Species
at the East Sacramento Valley Study Area

Scientific Name	Common Name	Status[a] Fed/CA
Grus canadensis tabida	Greater sandhill crane	-/CT
Numenius americanus	Long-billed curlew	-/CSC
Asio flammeus	Short-eared owl	-/CSC
Asio otus	Long-eared owl	-/CSC
Speotyto cunicularia	Burrowing owl	SC/CSC
Empidonax traillii	Willow flycatcher	-/CE
Progne subis	Purple martin	-/CSC
Riparia riparia	Bank swallow	-/CT
Lanius ludovicianus	Loggerhead shrike	SC/CSC
Agelaius tricolor	Tricolored blackbird	SC/CSC
Dendroica petechia brewsteri	Yellow warbler	-/CSC
Icteria virens	Yellow-breasted chat	-/CSC
Mammals		
Antrozous pallidus	Pallid bat	-/CSC
Euderma maculatum	Spotted bat	SC/CSC
Myotis lucifugus occultus	Little brown myotis	SC/CSC
Myotis yumanensis	Yuma myotis	SC/-
Plecotus townsendii	Townsend's big-eared bat	SC/CSC

[a]*Status Definitions:*

Federal

FE *Federal Endangered*
FT *Federal Threatened*
*PT** *Listing Petition Pending (not formally filed)*
SC *Federal Species of Concern*
FPE *Federally Petitioned as Endangered*

State

CSC *California Species of Special Concern*
CT *California Threatened*
CE *California Endangered*

Environmental Consequences

As part of the evaluation of the potential impacts to vegetation and wildlife, all habitat types within a corridor/alternative alignment were evaluated. The majority of habitat within the study is intensively managed cropland. This habitat provides benefits to many common wildlife species found in the valley including waterfowl, marsh and water birds, pheasants, and small mammals. However, the evaluation of the alternatives found that any permanent impacts to croplands would be small and therefore, us less than significant for the proposed action.

Potential project-related effects on biological resources of installing the proposed conveyance facilities will result primarily from the vegetation clearing and ground disturbance associated with construction activities. These types of construction impacts for pipeline installation are generally temporary. Construction of canals (e.g., GRA-1) and facilities such as siphons entails both permanent impact areas (the footprint of the constructed feature) and temporary impact areas (e.g., equipment staging sites). Intensively managed agricultural fields typically have either (1) low biological functions and values, or (2) these functions and values are distributed broadly over large areas.

Most potential adverse impacts to biological resources will be minimal if pipelines are placed in existing roadways wherever practicable. Outside of roadways, pipelines and canals routed around wetland and aquatic habitats (including non-jurisdictional canal habitat suitable for giant garter snakes) will also minimize adverse impacts to biological resources.

Anticipated Benefits. The construction of any of the conveyance alternatives will result in on-refuge habitat benefits by providing an additional, reliable water supply as detailed in the Background section, including the following:

- An earlier fall flood-up schedule for seasonal marsh to allow increased wildlife use, while easing water conveyance capacity constraints due to timing.

- Maintenance of additional acres of both summer water and permanent pond habitat types of both wildlife use and vegetation improvement.

- Increased acreage of watergrass (millet) and increased frequency of irrigations, if necessary, to provide a high-quality carbohydrate food source; while easing potential waterfowl crop depredation problems.

- Increased "flow-through" of maintenance water levels in all wetlands habitat units to decrease the potential of disease outbreaks, especially botulism, in wildlife species utilizing these habitats.

- Maintenance of water depths, using the year-round water delivery, that provide optimum foraging conditions for the majority of avian species.

Criteria for Determining Significance. The following discussion identifies the criteria used to determine the significance of potential impacts to vegetation, wildlife, and wetlands/waters resources.

Vegetation. Impacts to vegetation would be considered significant if they would result in any one of the following:

- Eliminate portions of unique natural communities such as freshwater marshes or riparian habitats

- Cause direct mortality of state-listed or federally listed plant species

- Substantial reductions in the size of a special-status plant species population

- Substantial reductions in the extent or values of habitats in which special-status plant populations occur

Wildlife. Impacts to wildlife are considered significant if they would result in any one of the following:

- Direct mortality of state-listed or federally listed wildlife species
- Temporary impacts to habitats such that listed species suffer increased mortality or lowered reproductive success
- Permanent loss of habitat critical to listed wildlife species
- Substantial reductions in the size of a special-status wildlife species population
- Substantial reduction in the quantity or value of habitats in which special-status and other wildlife populations occur

Wetlands/Waters. Impacts to wetlands and other waters are considered significant if they result in any one of the following:

- Permanent elimination of any amount of high-quality wetland and/or riparian habitat such as freshwater riparian, or annual grassland habitats
- Temporary or permanent damage or elimination of a substantial amount of any wetland and/or aquatic habitat
- Substantial degradation of water quality

Table IV-5 displays a matrix of plant and wildlife resource issues by proposed improvement corridor/site that are anticipated to be impacted by project construction activities. These potential impacts are discussed below. Figures IV-3 and IV-4 show the location of habitat (including wetlands) which could be utilized by special-status species along each alternative corridor. Tables IV-6 through IV-12 identify habitat type, temporary and permanent impact acreage and mitigation for alternatives which will result in impacts. Some alternatives will not result in off-refuge impacts and therefore tables for such alternatives are not included. These estimates are conservative and may over-estimate impacts, as they assume the entire 200-foot corridor would be impacted. It is the intent of Interior to minimize impacts to the greatest extent possible during final routing.

Vegetation. As described previously, impacts to plant communities are likely to result from vegetation clearing and ground disturbances related to construction activities. If avoidance of special-status plants is determined infeasible, impacts associated with pipeline construction would typically be short-term, but may be significant. Temporarily disturbed habitat is also susceptible to invasion by noxious weeds and non-native grasses. Impacts from facilities, such as the canal included as part of GRA-1, would be permanent.

Although not prevalent, significant impacts are also most likely to occur in the form of eliminated riparian and wetland habitat. While no vernal pools or swales were observed in any of the proposed linear conveyance facilities, some of the "vernal pool" plant species listed in Table IV-2 often occur in other seasonally wet features. Therefore, potential impacts to listed plant species are possible.

Wildlife. Construction impacts to wildlife would occur primarily as a consequence of habitat disturbance and, potentially, as disruptions of breeding efforts by special-status species. Of the listed species discussed previously, nesting Swainson's hawks are most vulnerable to construction-related disruption of breeding. Excessive disturbance can cause nest abandonment early in the nesting season or early fledging of young later in the season.

Direct mortality to listed species may occur during clearing, grading, and excavating activities if relatively immobile species are encountered. Giant garter snakes are particularly vulnerable to construction impacts during the inactive season (approximately October 1 to May 1). Removal of elderberry shrubs, the host plant of valley elderberry longhorn beetle larvae, can result in direct

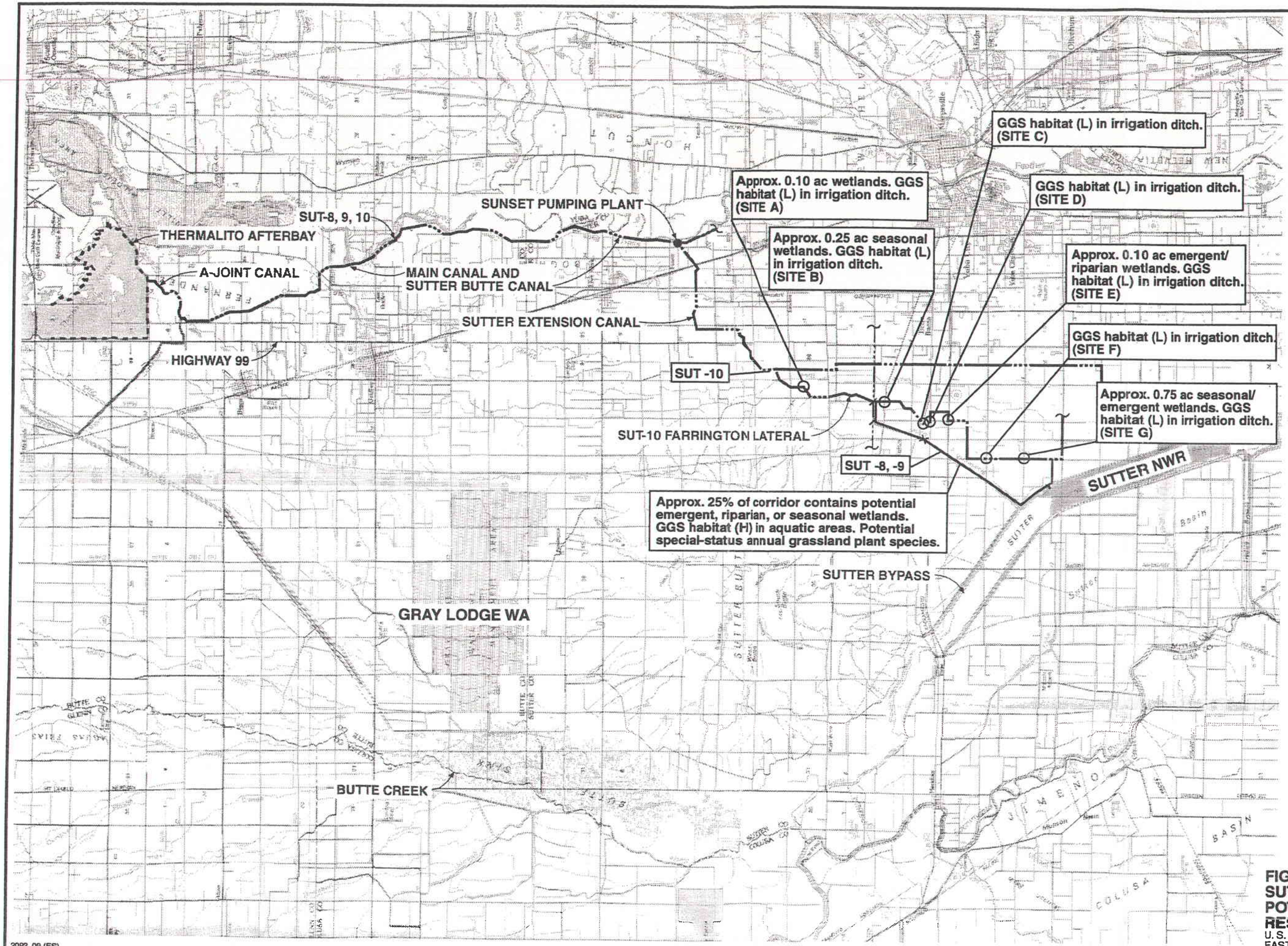

FIGURE IV-3
SUTTER NWR
POTENTIAL BIOLOGICAL RESOURCE AREAS
U. S. BUREAU OF RECLAMATION
EAST SACRAMENTO VALLEY, CALIFORNIA

2092_09 (ES)

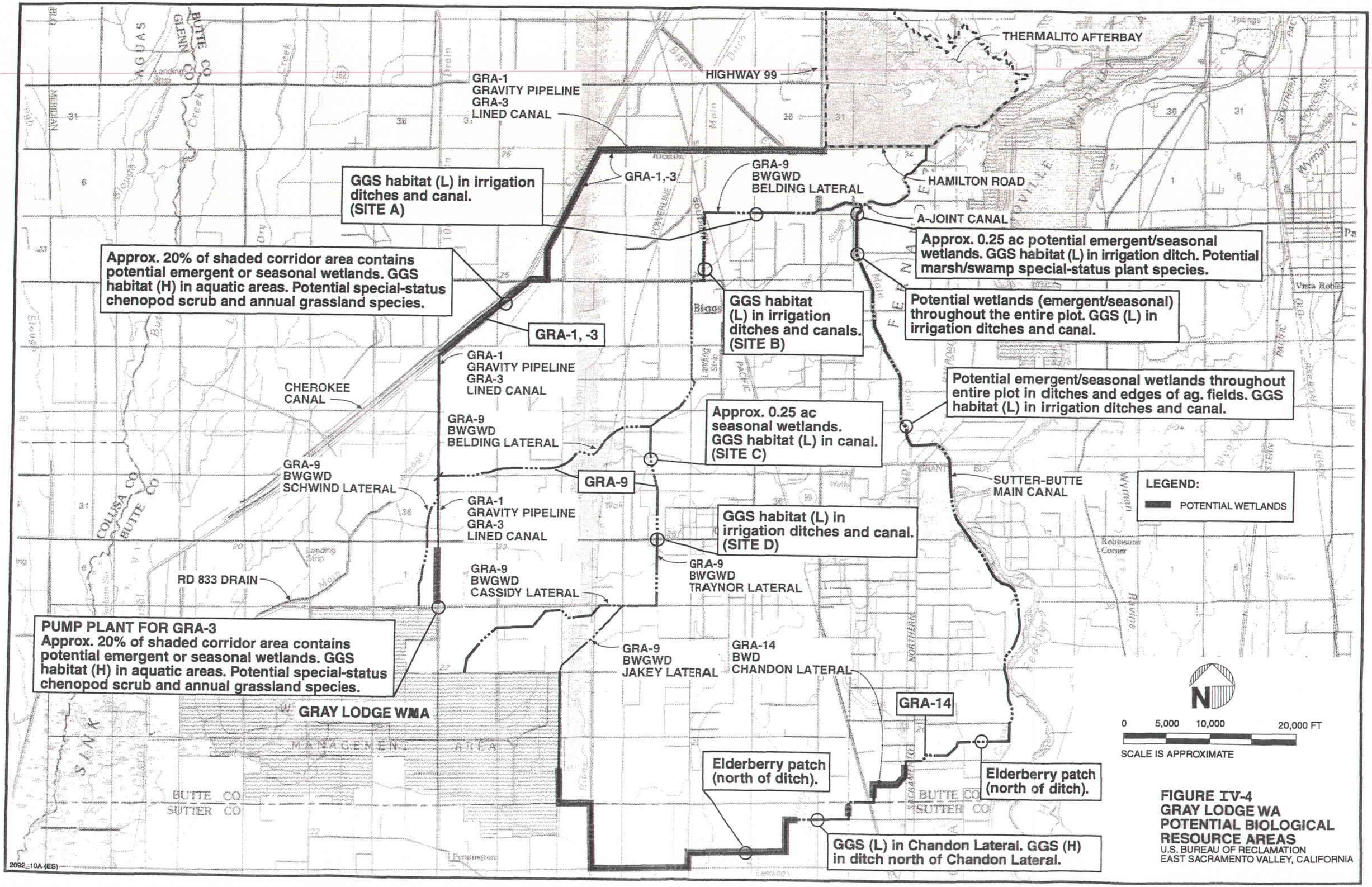

FIGURE IV-4
GRAY LODGE WA
POTENTIAL BIOLOGICAL RESOURCE AREAS
U.S. BUREAU OF RECLAMATION
EAST SACRAMENTO VALLEY, CALIFORNIA

2092-10A (ES)

Table IV-5
Potential Resource Issues by Proposed Improvement Site or Corridor

Proposed Site or Corridor Name	Special-Status Plant Issues[a]	Special-Status Wildlife Issues[b]	Number of Stream Crossings[c]
GRA-1	ChScr and VFGrs species	GGS (H) in aquatic habitats	0
GRA-3	ChScr and VFGrs species	GGS (H) in aquatic habitats	0
GRA-9	VFGrs species; potential elderberry at GRA-9 (Site C)	Potential VELB; GGS (L) in aquatic habitats	0
GRA-14	Two Elderberry locations within the Chandon Lateral corridor; one approximately .25 mile west of the Sutter/Butte Canal, and one approx. 1.5 miles west of Township Road; MshSw species at Site A;RpWld, MshSw species within the Chandon Lateral corridor	VELB; GGS (L) in aquatic habitats at Sites A, B, and C; GGS (H&L) in aquatic habitats within the Chandon Lateral corridor	1
SUT-8	VFGrs species	GGS (H) in aquatic habitats	1
SUT-9	VFGrs species	GGS (H) in aquatic habitats	1
SUT-10	VFGrs species	GGS (L) in aquatic habitats	0

[a]*Habitat Definitions:* *VFGrs = Valley and Foothill Grassland;* *ChScr = Chenopod of Scrub.* *RpWld = Riparian Woodland;* *MshSw = Marshes and Swamps*

[b] *Giant Garter Snake (GGS) habitat was ranked as high (H) or low (L) value. High-value habitats consisted of well-developed marshy areas with openings for basking, and adjacent uplands with burrowing locations and minimal disturbances. Low-value habitats consisted of less developed or maintained marshy areas with adjacent uplands generally more disturbed.*

[c] *Does not include canals or irrigation ditches, only jurisdictional features.*

Table IV-6
SUT-8. Impacts by Habitat Type and Mitigation Measures

Habitat Type	Approximate Impact Acreage			GGS Habitat	VELB Habitat Present	Swainson's Hawk Habitat	Potential Listed Plants[a]	Mitigation Measures
	Permanent	Temporary	Total					
VRI	0	0.49	0.49	Yes	No	Yes	No	2-7,10,11,14-20
AGS	0	53.9	53.9	No	No	Yes	Yes	1-7,14-20
FEW	0	16	16	Yes	No	Yes	No	2-7,10,11,14-20
PAS	0	20.3	20.3	No	No	Yes	No	7,14-20
RIV	0	17.3	17.3	Yes	No	No	No	2-7,10,11,14-20
CRO	0	56.4	56.4	No	No	Yes	No	7, 14
URB	0	4.1	4.1	No	No	Yes	No	7, 14
BAR	0	25.5	25.5	No	No	No	No	N/A

[a]*Potential impacts to plants coincide with AGS Habitat Type and occur in limited locations. See Figure IV-4.*

Key to Abbreviations:

VRI = Valley Foothill Riparian
AGS = Annual Grassland
FEW = Fresh Emergent Wetland
PAS = Pasture
RIV = Riverine
CRO = Cropland
URB = Urban (Rural Residential/Commercial)
BAR = Barren

Table IV-7
SUT-9. Impacts by Habitat Type and Mitigation Measures

Habitat Type	Approximate Impact Acreage			GGS Habitat	VELB Habitat Present	Swainson's Hawk Habitat	Potential Listed Plants[a]	Mitigation Measures
	Permanent	Temporary	Total					
VRI	0	0.49	0.49	Yes	No	Yes	No	2-7,10,11,14-20
AGS	0	53.9	53.9	No	No	Yes	Yes	1-7,14-20
FEW	0	16	16	Yes	No	Yes	No	2-7,10,11,14-20
PAS	0	20.3	20.3	No	No	Yes	No	7,14-20
RIV	0	17.3	17.3	Yes	No	No	No	2-7,10,11,14-20
CRO	0	56.4	56.4	No	No	Yes	No	7, 14
URB	0	4.1	4.1	No	No	Yes	No	7, 14
BAR	0	25.5	25.5	No	No	No	No	N/A

[a]*Potential impacts to plants coincide with AGS Habitat Type and occur in limited locations. See Figure IV-4.*

Key to Abbreviations:

VRI = Valley Foothill Riparian
AGS = Annual Grassland
FEW = Fresh Emergent Wetland
PAS = Pasture
RIV = Riverine
CRO = Cropland
URB = Urban (Rural Residential/Commercial)
BAR = Barren

Table IV-8
SUT-10. Impacts by Habitat Type and Mitigation Measures

Habitat Type	Approximate Impact Acreage			GGS Habitat	VELB Habitat Present	Swainson's Hawk Habitat	Potential Listed Plants[a]	Mitigation Measures
	Permanent	Temporary	Total					
VRI	0.6	0	0.6	Yes	No	Yes	No	2-7,10,11,14-20
AGS	0.2	0	0.2	No	Yes	Yes	No	2-7,14-20
FEW	0.7	0	0.7	Yes	Yes	Yes	No	2-7,10,11,14-20
PAS	0.9	0	0.9	No	Yes	Yes	No	7,14-20
RIV	1.1	0	1.1	Yes	Yes	No	No	2-7,10,11,14-20
CRO	2.2	0	2.2	No	Yes	Yes	No	7, 14
URB	0.9	0	0.9	No	Yes	Yes	No	7, 14

[a]*Potential impacts to plants coincide with AGS Habitat Type and occur in limited locations. See Figure IV-4.*

Key to Abbreviations:

VRI = Valley Foothill Riparian
AGS = Annual Grassland
FEW = Fresh Emergent Wetland
PAS = Pasture
RIV = Riverine
CRO = Cropland
URB = Urban (Rural Residential/Commercial)

Table IV-9
GRA-1. Impacts by Habitat Type and Mitigation Measures

Habitat Type	Approximate Impact Acreage			GGS Habitat	VELB Habitat Present	Swainson's Hawk Habitat	Potential Listed Plants[a]	Mitigation Measures
	Permanent	Temporary	Total					
AGS	0	26.9	26.9	No	No	Yes	Yes	1-7,14-20
FEW	0	7.7	7.7	Yes	No	Yes	No	2-7,10,11,14-20
PAS	0	5.4	5.4	No	No	Yes	No	7,14-20
RIV	0	5.6	5.6	Yes	No	No	No	2-6,10,11,14-20
CRO	0	203.8	203.8	No	No	Yes	No	7, 14
URB	0	2.7	2.7	No	No	Yes	No	7, 14
BAR	0	11.1	11.1	No	No	No	No	N/A

[a]*Potential impacts to plants coincide with AGS Habitat Type and occur in limited locations. See Figure IV-4.*

Key to Abbreviations:

AGS = Annual Grassland
FEW = Fresh Emergent Wetland
PAS = Pasture
RIV = Riverine
CRO = Cropland
URB = Urban (Rural Residential/Commercial)
BAR = Barren

Table IV-10
GRA-3. Impacts by Habitat Type and Mitigation Measures

Habitat Type	Approximate Impact Acreage			GGS Habitat	VELB Habitat Present	Swainson's Hawk Habitat	Potential Listed Plants[a]	Mitigation Measures
	Permanent	Temporary	Total					
AGS	26.9	0	26.9	No	No	Yes	Yes	1-7,14-20
FEW	7.7	0	7.7	Yes	No	Yes	No	2-7,10,11,14-20
PAS	5.4	0	5.4	No	No	Yes	No	7,14-20
RIV	5.6	0	5.6	Yes	No	No	No	2-6,10,11,14-20
CRO	203.8	0	203.8	No	No	Yes	No	7, 14
URB	2.7	0	2.7	No	No	Yes	No	7, 14
BAR	11.1	0	11.1	No	No	No	No	N/A

[a]*Potential impacts to plants coincide with AGS Habitat Type and occur in limited locations. See Figure IV-4.*

Key to Abbreviations:

AGS = Annual Grassland
FEW = Fresh Emergent Wetland
PAS = Pasture
RIV = Riverine
CRO = Cropland
URB = Urban (Rural Residential/Commercial)
BAR = Barren

Table IV-11
GRA-9. Impacts by Habitat Type and Mitigation Measures

Habitat Type	Approximate Impact Acreage			GGS Habitat	VELB Habitat Present	Swainson's Hawk Habitat	Potential Listed Plants[a]	Mitigation Measures
	Permanent	Temporary	Total					
FEW	0.85	0	0.85	Yes	No	Yes	Yes	1-7,10,11,14-20
PAS	0.65	0	0.65	No	No	Yes	No	7,14-20
RIV	1.1	0	1.1	Yes	No	No	No	2-6,10,11,14-20
CRO	1.3	0	1.3	No	No	Yes	No	7, 14
URB	0.1	0	0.1	No	No	Yes	No	7, 14

[a]*Potential impacts to plants coincide with FEW Habitat Type and occur in limited locations. See Figure IV-4.*

Key to Abbreviations:

FEW = Fresh Emergent Wetland
PAS = Pasture
RIV = Riverine
CRO = Cropland
URB = Urban (Rural Residential/Commercial)

Table IV-12
GRA-14. Impacts by Habitat Type and Mitigation Measures

Habitat Type	Approximate Impact Acreage			GGS Habitat	VELB Habitat Present	Swainson's Hawk Habitat	Potential Listed Plants	Mitigation Measures
	Permanent	Temporary	Total					
VRI	0	6	6	Yes	Yes	Yes	No	2-11,14-20
AGS	0	12.4	12.4	No	No	Yes	No	2-7,14-20
FEW	0.6	8	8.6	Yes	No	Yes	Yes	1-7,10,11,14-20
PAS	0.95	2.8	3.75	No	No	Yes	No	7,14-20
RIV	0.9	19	19.9	Yes	No	No	No	2-6,10,11,14-20
CRO	0.35	95	95.35	No	No	Yes	No	7, 14
OVN	0	81.3	81.3	No	Yes	Yes	No	7-9, 14
URB	0.1	2.5	2.6	No	No	Yes	No	7, 14
BAR	0	26.6	26.6	No	No	No	No	N/A

[a]*Potential impacts to plants coincide with FEW Habitat Type and occur in limited locations. See Figure IV-4.*

Key to Abbreviations:

VRI = Valley Foothill Riparian
AGS = Annual Grassland
FEW = Fresh Emergent Wetland
PAS = Pasture
RIV = Riverine
CRO = Cropland
OVN = Orchard/Vineyard
URB = Urban (Rural Residential/Commercial)
BAR = Barren

mortality. Grading and/or dewatering of ponded depressions may result in the elimination of listed fairy shrimp and tadpole shrimp.

Wetlands/Waters. Potentially significant impacts to wetlands and other waters may result from (1) the discharge of fill into these habitats, (2) the dewatering of wetland and aquatic habitats, or (3) substantial temporary increases in water turbidity or pollutants.

These impacts can occur wherever the project corridors bisect wetlands or other waters. Alternatives that contain greater estimated wetland acreage and a greater number of stream crossings (see Tables IV-13 through IV-19) are more likely to have impacts.

On-Refuge Wetlands/Waters. The increase in water available for use on the Sacramento, Delevan, and Colusa NWRs from increasing total supplies to Level 4 will result in a number benefits which are further described earlier in this section, as well as the Background section. Benefits include the ability for earlier flood-up for seasonal marsh to allow for increased use, as well as increased flexibility in terms of habitat management throughout other times of the year. The increased supplies will also allow for increased "flow through" of maintenance water levels in all wetlands habitat units which will in turn reduce the potential of disease outbreaks such as botulism. The additional increment of water will also be used to increase the acreage of water (millet), as well as allow for additional development of wetland habitat through out the complex over the next several years. The policies for the three refuges are further detailed in the following documents:

- Annual Habitat Management Plan, 1996, Sacramento NWR Complex
- Management Plan for Graylodge Wildlife Area, SCH No. 88122012, January 1989
- Final Environmental Study on the Operation of the National Wildlife Refuge System, November 12, 1976, Code No. FES 76-59

Mitigation

The following mitigation measures are incorporated as part of each alternative and will reduce potential impacts to vegetation, wildlife, and wetlands/waters discussed above to less-than-significant levels:

Vegetation. Following are the mitigation measures for biological resource (BR) impacts to vegetation:

- BR-1. Conduct pre-construction surveys prior to final design to identify locations of special-status plants (see appended *Guidelines for Assessing the Effects of Proposed Developments on Rare and Endangered Plants and Plant Communities*). Surveys must be timed to coincide with the flowering seasons of the targeted species listed in Table IV-2. Following pre-construction surveys, avoid impacts to special-status plants by through facility routing.

Table IV-13
SUT-8. Jurisdictional Wetlands Acreage Impacts

Wetland Type	Impact Acreage	
	Permanent	Temporary
AGS	0	0.87

Key to Abbreviations:

AGS = Annual Grassland

Table IV-14
SUT-9. Jurisdictional Wetlands Acreage Impacts

Wetland Type	Impact Acreage	
	Permanent	Temporary
AGS	0	0.87

Key to Abbreviations:

AGS = Annual Grassland

Table IV-15
SUT-10. Jurisdictional Wetlands Acreage Impacts

Wetland Type	Impact Acreage	
	Permanent	Temporary
VRI	0.1	0
PAS	0.9	0
FEW	0.1	0

Key to Abbreviations:

VRI = Valley Foothill Riparian
PAS = Pasture
FEW = Fresh Emergent Wetland

Table IV-16
GRA-1. Jurisdictional Wetlands Acreage Impacts

Wetland Type	Impact Acreage	
	Permanent	Temporary
AGS	0.25	1.31
PAS	0	0.33

Key to Abbreviations:

AGS = Annual Grassland
PAS = Pasture

Table IV-17
GRA-3. Jurisdictional Wetlands Acreage Impacts

Wetland Type	Impact Acreage	
	Permanent	Temporary
AGS	1.56	0
PAS	0.33	0

Key to Abbreviations:

AGS = Annual Grassland
PAS = Pasture

Table IV-18
GRA-9. Jurisdictional Wetlands Acreage Impacts

Wetland Type	Impact Acreage	
	Permanent	Temporary
PAS	0.25	0

Key to Abbreviations:

PAS = Pasture

Table IV-19
GRA-14. Jurisdictional Wetlands Acreage Impacts

Wetland Type	Impact Acreage	
	Permanent	Temporary
AGS	2.12	0
PAS	0.4	0
FEW	0.6	0
RIV	0	1.23

Key to Abbreviations:

AGS = Annual Grassland
PAS = Pasture
FEW = Fresh Emergent Wetland
RIV = Riverine

- BR-2. Where avoidance of special-status plants is not practicable, develop and implement measures for mitigating impacts, including relocation or reestablishment of special-status plant populations. Mitigation would involve creating suitable habitat in non-suitable habitat by providing soil, water, and vegetation to replicate conditions needed to establish special-status species populations.

- BR-3. Prior to final design, map and quantify riparian habitat and other important natural plant communities. Develop measures to avoid or minimize impacts to these habitats.

- BR-4. Develop and implement mitigation measures for unavoidable impacts to riparian habitat. Where possible, disturbed riparian habitat should be restored onsite following completion of construction activities. Permanently eliminated riparian habitat should be replaced at a 2:1 ratio (i.e., 2 acres of habitat created for each acre eliminated). Mitigation would involve creating riparian habitat in non-riparian habitat by providing soil, water, and vegetation.

- BR-5. Develop and implement a revegetation plan for temporarily disturbed construction sites. The revegetation plan should incorporate seeding and planting of species that will resist invasion by noxious weeds.

- BR-6. Develop and implement a monitoring plan to assess the success of mitigation measures for impacts to vegetation and special-status species. All plantings on the revegetation and compensation sites should be monitored during the growing season (March through September) to determine growth rates for 3 years from the date of transplant or planting. A yearly report including dates of watering, growth rates, cover rates, and mortality figures should be submitted to the Service. Monitoring could be curtailed after 3 years if success is demonstrated (plant cover of the mitigation site is at least 80 percent of the cover at the impact site prior to project disturbance and vegetative composition of the dominant (> 20 percent of the cover) and characteristic species (typical, regularly occurring in the habitat but not dominant) exceeds 80 percent of what was present at the impact site. Monitoring of special-status plant mitigation sites could be curtailed after 3 years if overall survival rates of seeded, planted, or transplanted plants exceed 80 percent of projected survival rates.

Wildlife. Following are the mitigation measures for BR impacts to wildlife:

- BR-7. Conduct pre-construction surveys for raptors (including Swainson's hawk) prior to the peak March-through-August nesting period. Construction during the critical nesting period (March through August) will be avoided, OR if nesting pairs and fledglings are identified within 0.25 miles of construction, a monitoring program will be initiated in consultation with the Department.

- BR-8. Conduct pre-construction surveys for presence of VELB and elderberry bushes prior to initiation of construction. During final design, re-align linear facilities outside of VELB habitat. Where VELB habitat cannot be avoided, buffer zones will be established around elderberry shrubs.

- BR-9. If impacts to individual elderberry shrubs cannot be avoided, (1) shrubs should be trimmed instead of removed whenever possible, and (2) removed shrubs with stems greater than 1.0 inches in diameter should be transplanted. Elderberry mitigation should follow procedures outlined in *Mitigation Guidelines for the Valley Elderberry Longhorn Beetle* (Service, September 1996).

- BR-10. Conduct pre-construction surveys for GGS. Surveys should be conducted between April 15 and June 1 by a qualified

biologist and should follow the procedures outlined in *Protocols for Pre-project Surveys to Determine the Presence of Giant Garter Snake (GGS) and to Evaluate Habitats* (Service, 1993). During final design, avoid all habitat features that contain GGS or provide suitable habitat for GGS.

- BR-11. If impacts to GGS habitat cannot be avoided, employ mitigation measures to avoid direct impacts to snakes. No grading, excavating, or filling will take place within 30 feet of GGS habitat between October 1 and May 1. To ensure avoidance of impacts to individual snakes, a trained monitor will be present onsite to remove snakes prior to construction if individual snakes are found to be present. Other elements of GGS mitigation should be consistent with the *Guidelines for Procedures and Timing of Activities Related to the Modification or Relocation of Giant Garter Snake Habitat* (Service, 1990).

- BR-12. If any potential habitat for listed shrimp species will be impacted (i.e., if construction activities will occur within 250 feet of the edge of a pool or swale), conduct pre-construction surveys for fairy shrimp and tadpole shrimp. Surveys should be conducted according to methods outlined in *Interim Guidelines for Surveys for the Endangered Conservancy Fairy Shrimp, Longhorn Fairy Shrimp, Riverside Fairy Shrimp, Vernal Pool Tadpole Shrimp, and the Threatened Vernal Pool Fairy Shrimp.* During final design, avoid by 250 feet all features containing listed shrimp.

- BR-13. If habitats containing listed shrimp species cannot be avoided, develop compensatory mitigation for impacts to fairy shrimp in consultation with the Service. Mitigation for listed fairy shrimp and tadpole shrimp usually involves a combination of habitat creation at a 1:1 replacement ratio and preservation ("banking") of existing habitat at a 2:1 ratio.

- BR-14. Develop and implement a monitoring plan to assess the success of mitigation measures for impacts to special-status wildlife. Success criteria shall be clearly defined for all measures implemented to mitigate for project impacts to wildlife. Yearly reports should be submitted to the Service and the Department. If success criteria are being met after 3 years of monitoring, no additional monitoring is necessary.

Wetlands/Waters. Following are the mitigation measures for BR impacts to wetlands/ waters:

- BR-15. Conduct pre-construction delineations of wetlands and other waters of the United States. Request a verification of the delineated boundaries from the U.S. Army Corps of Engineers (COE). Following verification of the delineation boundaries, develop measures to avoid impacts to jurisdictional wetlands.

- BR-16. After final design, quantify impacts to wetlands and other waters. Submit to COE a permit application for discharge of fill material into waters of the United States, pursuant to Section 404 of the Clean Water Act.

- BR-17. Install and maintain appropriate erosion and sedimentation controls during and following construction as specified in the required Erosion Control Plan (see Hydrology and Water Quality section).

- BR-18. Obtain a streambed alteration agreement with the Department, pursuant to Section 1601 of the Fish and Game Code, before initiating construction within the 100-year floodplain of any stream crossing.

- BR-19. Develop and implement mitigation plans for impacts to wetlands. Replace eliminated wetlands at a 2:1 ratio. Temporarily impacted wetlands should be restored onsite. Stockpile topsoil removed from wetlands and store in upland land-

scape positions. Following construction disturbance, restore the land surface contours and backfill the top 6 to 12 inches with stockpiled topsoil.

- BR-20. Following project completion, monitor the site to assess mitigation success. Success criteria should be clearly defined for all measures implemented to mitigate for project impacts to wetlands. Yearly reports should be submitted to the Service and COE until implementation has been determined to be successful.

Biological Resources impacts and mitigation measures are summarized in Table IV-20.

Table IV-20
Biological Resources Impacts and Mitigation Measures

Impact	Mitigation	Level of Significance After Mitigation
BR-a Alternatives SUT-8, SUT-9, GRA-1, BRA-3, GRA-9, and GRA-14 could impact listed plants.	BR-1 Conduct pre-construction surveys prior to final design to identify locations of special-status plants. Surveys must be timed to coincide with the flowering seasons of the targeted species. Following pre-construction surveys, avoid impacts to special-status plants by through facility routing. BR-2 Where avoidance of special-status plants is not practicable, develop and implement measures for mitigating impacts, including relocation or reestablishment of special-status plant populations. Mitigation would involve creating suitable habitat in non-suitable habitat by providing soil, water, and vegetation to replicate conditions needed to establish special-status species populations.	LS
BR-b Alternatives SUT-8, SUT-9, SUT-10, and GRA-14 could impact between 0.49 to 6 acres of riparian habitat.	BR-3 Prior to final design, map and quantify riparian habitat and other important natural plant communities. Develop measures to avoid or minimize impacts to these habitats. BR-4 Develop and implement mitigation measures for unavoidable impacts to riparian habitat. Where possible, disturbed riparian habitat should be restored onsite following completion of construction activities. Permanently eliminated riparian habitat should be replaced at a 2:1 ratio (i.e., 2 acres of habitat created for each acre eliminated). Mitigation would involve creating riparian habitat in non-riparian habitat by providing soil, water, and vegetation. BR-5 Develop and implement a revegetation plan for temporarily disturbed construction sites. The revegetation plan should incorporate seeding and planting of species that will resist invasion by noxious weeds.	LS

Table IV-20
Biological Resources Impacts and Mitigation Measures

Impact	Mitigation	Level of Significance After Mitigation
BR-b (continued)	BR-6 Develop and implement a monitoring plan to assess the success of mitigation measures for impacts to vegetation and special-status species. All plantings on the revegetation and compensation sites should be monitored during the growing season (March through September) to determine growth rates for 3 years from the date of transplant or planting. A yearly report including dates of watering, growth rates, cover rates, and mortality figures should be submitted to the Service. Monitoring could be curtailed after 3 years if success is demonstrated (plant cover of the mitigation site is at least 80 percent of the cover at the impact site prior to project disturbance and vegetative composition of the dominant (> 20 percent of the cover) and characteristic species (typical, regularly occurring in the habitat but not dominant) exceeds 80 percent of what was present at the impact site. Monitoring of special-status plant mitigation sites could be curtailed after 3 years if overall survival rates of seeded, planted, or transplanted plants exceed 80 percent of projected survival rates. BR-18 Obtain a streambed alteration agreement with the Department, pursuant to Section 1601 of the Fish and Game Code, before initiating construction within the 100-year floodplain of any stream crossing.	LS
BR-c Alternatives SUT-8, SUT-10, GRA-1, GRA-3, GRA-9, GRA-14 could impact habitat used by Swainson's hawk during the critical nesting period.	BR-7 Conduct pre-construction surveys for raptors (including Swainson's hawk) prior to the peak March-through-August nesting period. Construction during the critical nesting period (March through August) will be avoided, OR if nesting pairs and fledglings are identified within 0.25 miles of construction, a monitoring program will be initiated in consultation with the Department.	LS
BR-d Alternatives SUT-10 and GRA-14 could impact areas combining elderberry shrubs.	BR-8 Conduct pre-construction surveys for presence of VELB and elderberry bushes prior to initiation of construction. During final design, re-align linear facilities outside of VELB habitat. Where VELB habitat cannot be avoided, buffer zones will be established around elderberry shrubs.	LS

Table IV-20
Biological Resources Impacts and Mitigation Measures

Impact	Mitigation	Level of Significance After Mitigation
BR-d (continued)	BR-9 If impacts to individual elderberry shrubs cannot be avoided, (1) shrubs should be trimmed instead of removed whenever possible, and (2) removed shrubs with stems greater than 1.0 inches in diameter should be transplanted.	LS
BR-e Alternatives SUT-8, SUT-10, GRA-1, GRA-3, GRA-9, GRA-14 could impact habitat used by giant garter snake.	BR-10 Conduct pre-construction surveys for GGS. Surveys should be conducted between April 15 and June 1 by a qualified biologist. During final design, avoid all habitat features to the extent possible that contain GGS or provide suitable habitat for GGS. BR-11 If impacts to GGS habitat cannot be avoided, employ mitigation measures to avoid direct impacts to snakes. No grading, excavating, or filling will take place within 30 feet of GGS habitat between October 1 and May 1. To ensure avoidance of impacts to individual snakes, a trained monitor will be present onsite to remove snakes prior to construction if individual snakes are found to be present. BR-14 Develop and implement a monitoring plan to assess the success of mitigation measures for impacts to special-status wildlife. Success criteria shall be clearly defined for all measures implemented to mitigate for project impacts to wildlife. Yearly reports should be submitted to the Service and the Department. If success criteria are being met after 3 years of monitoring, no additional monitoring is necessary.	LS
BR-f Alternatives SUT-8, SUT-10, GRA-1, GRA-3, GRA-9, GRA-14 could impact between 0.1 to 2.12 acres of jurisdictional wetlands.	BR-15 Conduct pre-construction delineations of wetlands and other waters of the United States. Request a verification of the delineated boundaries from the COE. Following verification of the delineation boundaries, develop measures to avoid impacts to jurisdictional wetlands. BR-16 After final design, quantify impacts to wetlands and other waters. Submit to COE a permit application for discharge of fill material into waters of the United States, pursuant to Section 404 of the Clean Water Act.	LS

Table IV-20
Biological Resources Impacts and Mitigation Measures

Impact	Mitigation	Level of Significance After Mitigation
BR-f (continued)	BR-17 Install and maintain appropriate erosion and sedimentation controls during and following construction as specified in the required Erosion Control Plan (see Hydrology and Water Quality section). BR-19 Develop and implement mitigation plans for impacts to wetlands. Replace eliminated wetlands at a 2:1 ratio. Temporarily impacted wetlands should be restored onsite. Stockpile topsoil removed from wetlands and store in upland landscape positions. Following construction disturbance, restore the land surface contours and backfill the top 6 to 12 inches with stockpiled topsoil. BR-20 Following project completion, monitor the site to assess mitigation success. Success criteria should be clearly defined for all measures implemented to mitigate for project impacts to wetlands. Yearly reports should be submitted to the Service and COE until implementation has been determined to be successful.	LS

LS = Less than significant

Cultural Resources

Affected Environment

Prehistoric/Ethnographic Resources. The plains between the Sacramento River and the lower Feather River were not a very productive environmental zone for late prehistoric hunters and collectors. The area lies between the highly productive area near the river and the oak lands of the Sierra Nevada foothills. Both areas were more heavily used in prehistory than were the intervening grassy plains. It is probable that greatest use of the area was by foraging parties from the people based along the river.The study area lies in a boundary zone between the ethnographically known territories of three different Native American groups. The boundaries were fluid over time and there was probably mutual use of some marginal territory as well, so there is little point in arguing which group might have controlled what specific area. The Konkow to the north and the Nisenan to the south spoke closely related, but mutually unintelligible, languages of the Maiduan language family. The Patwin, located primarily west of the Sacramento River but controlling part of the east bank, spoke a more divergent language. All three languages belong to the Penutian superstock (Shipley, 1978). No matter which group controlled the plains between the Sacramento and the lower Feather at any given time, the way of life was decidedly similar.

The territory of all three main groups crossed multiple topographic and corresponding vegetation zones. It is unlikely that any one village had access to more than one or two biotic zones, but the cumulative territorial holdings included Montane Forest, Montane Chaparral,

Riparian Woodland, Valley and Foothill Woodland Chaparral, and Valley Grassland (Ornduff, 1974). Within each plant community were food resources for exploitation comprised of those faunal members associated with the biotic zones. Trade between villages allowed all of the population access to the various resources.

The pattern of "village communities" (Kroeber, 1925) constituted the only political organization. A community was comprised of several geographically-related villages with one maintaining a large semisubterranean ceremonial lodge (Riddell, 1978). This larger lodge may also have been the dwelling of the headman, who was the more authoritative person in the community. The headman acted only as a spokesman and advisor to the people and apparently lacked magisterial powers. Each village community held a known territory in which all community members had hunting and fishing rights (Kroeber, 1925; Riddell, 1978). All three groups practiced hunting, gathering, and fishing subsistence strategies. Their intimate knowledge of the flora and fauna ensured an efficient exploitation of their environs. The largest game animal that was hunted for its meat was the deer. Smaller mammals were not excluded as protein sources, although wolf, dog, and coyotes were not eaten. Fishing produced salmon, trout, steelhead, eels, and other rough fish, and freshwater clams and mussels were obtained from the main rivers (Wilson, 1978).

Historic Resources. The Sutter NWR project area is near the boundaries of three Mexican grants–New Helvetia, Boga, and Honcut. The Boga plat shows a number of historic period features along the early road from Marysville to Hamilton including houses, fences, fields, a tavern, farms, and barns, some of which lie very near the alignment. Also shown on the Boga Rancho plat are several "Indian Rancherias," one of which was the village of "Boga," the source of the rancho's name and obviously occupied at the time of contact. The land was fairly rich not only in the bottom lands along the various drainages but throughout the study area, and there was a plentiful water supply. Outside of what is now the Sutter Bypass, shown as "Swamp and Overflowed Land," early survey maps of the southern portion of the study area show a number of structures, fences, and roads in the area in the 1860s and 1870s. Most of the land outside the ranchos was taken up as homesteads or purchased as cash entry patents in the 1860s.

In the Gray Lodge WA project vicinity, the pattern of land use varies greatly. Along the Feather River, the rich bottom land was included in the Fernandez land grant. Along the western and southern ends, much of the study area was taken up in smaller parcels (40- and 80-acre), with alternating sections granted to the railroad. The remainder of the area was also "checkerboard" pattern, with alternating sections acquired by the railroad, and 160-acre parcels acquired by settlers in the 1860s to 1870s. The Sacramento Northern Railroad also crosses the study area, as well as several early water conveyance features.

Environmental Consequences

Criteria for Determining Significance. Under federal regulations, significant cultural resources are those that qualify for inclusion in the NRHP. The criteria for inclusion on the register are as follows:

> *The quality of significance in American history, architecture, archeology, engineering, and culture is present in districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, materials, workmanship, feeling, and association, and*
>
> *A. that are associated with events that have made a significant contribution to the broad patterns of our history; or*
>
> *B. that are associated with the lives of persons significant in our past; or*

C. *that embody the distinctive characteristics of a type, period, or method of construction or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or*

D. *that have yielded, or may be likely to yield, information important in prehistory or history.* (36 CFR 60.4)

Exceptions are made to these criteria for cemeteries, birthplaces, or graves of historical figures; religious properties; structures that have been moved; reconstructed historical buildings; properties that are primarily commemorative in nature; and properties fewer than 50 years old. Such properties may be eligible for the register if they are of exceptional importance.

Prehistoric/Ethnographic Resources. The Northeast Information Center noted that very little survey work had been done in either project area. Four sites were recorded near the Gray Lodge WA survey area, all of them in the 1960s with minimal data recorded by modern standards. Because of the vague locations of these resources, particular care was taken during the survey in the vicinity of the recorded site location, in case the actual location was within the survey area. In one case, CA-BUT-326, the site was recorded on the GRA-9 alignment. The field survey did not find any indication of a prehistoric site in this area, but the 1969 survey record states, "Provenience already destroyed, as well as any aboriginal structures." This probably refers to cultivation of the fields in the site area; however, it is possible that an intact cultural deposit exists below the plow zone, with or without surface indications.

Historic Resources. In the Sutter NWR project area, the Wadsworth Canal is the primary historic feature. On the 1911 U.S. Geological Survey (USGS) map, this feature appears as, essentially, a natural water course that is partially in natural condition and partially contained by levees. It is fed by fully artificial ditches from the north. The canal appears to be a major engineering feature that is historically important in the economic development of the surrounding lands. Impact to the canal, both physical and visual, should be minimized to the extent possible. This particularly applies to the crossing of the Sacramento Northern tracks. If impact to the canal is minimized, a finding of no adverse effect (see below) may be supported. If not, then historic research to document the importance of the canal will be necessary, along with detailed recording of any features that will be adversely affected. The mainline of the Sacramento Northern has already been determined to be a significant historical feature in Sacramento County, and there is no reason to believe this would not apply to the Colusa Branch as well. The bridge over the Wadsworth Canal should be preserved intact if at all feasible. The only other major feature is the existing dam on the Sutter Bypass at the south end of the project. Impact to this structure should certainly be avoided.

The Northeast Information Center noted the importance of the Cherokee Canal. This was constructed by the Spring Valley Mining Company in 1876. Its original purpose was to convey excess water from mining operations to the east past agricultural lands to an outlet in the Butte Sink. The lands bordering the canal became known as the Cherokee Strip.

The field survey of the project areas revealed several potentially significant cultural resources. In the Sutter NWR, the Sutter Bypass will not be directly affected by the project, but the SUT-8 and SUT-9 alignments along the Wadsworth Canal will be. In addition, the crossing of the Wadsworth Canal by the Sacramento Northern line is on a concrete bridge that may date to the original construction of the Marysville-Colusa Branch in 1913 (Swett, 1962). There is no date on the bridge

to confirm this, but the bridge's general appearance and condition suggest an early date. The Farrington Lateral survey areas are devoid of historic resources.

In the Gray Lodge WA project area there is only one old building within the survey area, although there are a couple of modern ones. The building is a plain barn located south of Liberty Road adjacent to the unnamed lateral in T17N, R2E, northeast quarter of Section 8 along the GRA-9 alignment. Other historic features in this project area are the water conveyance facilities that will be used by the project and the Cherokee Canal adjacent to the survey area.

The oldest feature on the GRA-14 alignment is a 1937 bridge carrying Riviera Road over the Chandon Lateral at the edge of the Boga land grant. Though it is old enough to be considered a potential historic resource, the bridge is a simple concrete slab structure lacking in historical or architectural significance. Similar findings apply to the Rio Bonito Road bridge over the Sutter Butte Canal, which was evaluated by Janevein in a 1993 survey.

The recorded location of CA-BUT-326, essentially all of the northeast quarter of Section 8, associated with the GRA-9 alignment, is a sensitive zone. If the project involves only improvement of the existing canal with minimal surface impact outside of the canal, then no impact should occur. However, a possibility exists that a significant prehistoric resource could be present below the plow zone in this area. If excavation will be conducted outside the existing canal alignment, survey and, if necessary, test excavation should be conducted in advance to determine the presence or absence of the site.

Mitigation

The mitigation measures are incorporated as part of each alternative and will avoid causing any significant impacts. Cultural resources impacts and mitigation measures are summarized in Table IV-2.

Table IV-21
Cultural Resources Impacts and Mitigation Measures

Impact		Mitigation		Level of Significance After Mitigation
CR-a	Alternatives GRA-9 could impact prehistoric cultural resource CA-BUT-326.	CR-1	Route conveyance facilities to avoid cultural resource CA-BUT-326.	LS
CR-b	Alternatives SUT-8 and SUT-9 could impact the Sacramento Northern Railroad bridge crossing of the Wadsworth Canal adjacent to the SUT-8/SUT-9 alignments.	CR-2	Route conveyance facilities to avoid the bridge.	LS
CR-c	Alternatives GRA-14 could impact historic structure.	CR-3	Route conveyance facilities to avoid the historic structure.	LS

LS = Less than significant

There is no indication that a subsurface cultural deposit elsewhere in either project area is likely. However, the possibility cannot be totally eliminated based on surface inspection alone. If artifacts or unusual amounts of stone, bone, or shell are uncovered during construction activities, excavation should cease in the area of the find until the evaluation is completed. If human bone uncovered on non-federal lands, state law requires that the County Coroner must be contacted. If the coroner determines that the bone is likely to be Native American in origin, then activities must comply with state law and regulation. On Federal lands the Native American Graves Protection and Repatrition Act applies.

Completion of Section 106 Compliance

The procedures for complying with Section 106 of the National Historic Preservation Act (NHPA) are specified in 36 CFR 800. The analysis presented in this EA/IS serves as an overview and initial study to determine the parameters of potential impact to historic resources. Prior to construction of the selected alternative, the following steps will be necessary to satisfy the regulations:

- Identify an area of potential environmental effect (APEE) for the project. This should include visual as well as physical effects and should include areas where equipment and materials will be stored near the construction zone as well as direct construction areas.

- Field survey any areas in the APEE that were not examined in the current project, and record and formally evaluate all resources in the APEE.

- Produce a technical report on the findings of the above, including recommendations for mitigation, if necessary. This report should be submitted to Reclamation for review and distribution to the SHPO and other interested agencies.

- If no significant cultural resources are located in the APEE and if Reclamation and SHPO concur in this finding, this completes the Section 106 process. If a significant property is located in the APEE, the criteria of Effect and Adverse Effect [36 CFR 800.9(a and b)] are applied to determine if the project will have an adverse effect on the property. This should be included in the technical report mentioned above. If a finding of no effect or no adverse effect is made, and the agencies concur, the Section 106 process is completed. In the case of no adverse effect, Reclamation provides documentation to the ACHP for their concurrence. If adverse effect is identified, then a detailed mitigation plan must be developed in consultation with the ACHP (at the Council's option), SHPO, Reclamation, the project proponent, and other interested parties as necessary. Implementation of the mitigation through a Memorandum of Agreement constitutes compliance with Section 106.

Hydrology and Water Quality

Affected Environment

Surface Water. The primary source of water for the two habitat areas varies from surface water supplies from both the CVP and SWP, as well as groundwater. Sutter NWR, located within the Sutter Bypass, is served by SEWD, which obtains their water from the Feather River via the CVP Sunset Pumping Facility. Water is then conveyed through existing SEWD canals and ultimately through the East and West Borrow Ditches of the Sutter Bypass through existing agreements. Gray Lodge is served by BWGWD, which diverts water from the Thermalito Afterbay. Water is subsequently conveyed through existing canals to the refuge area. A portion of this supply is provided by on-refuge wells as discussed below. Feather River flows are regulated by the operation of Lake Oroville and the Thermalito Afterbay, which are part of the SWP. Between Thermalito Afterbay and the

Feather River's confluence with the Sacramento River north of Sacramento, the primary tributaries into the Feather are the Yuba and Bear Rivers. Other smaller tributaries also contribute additional flows.

Groundwater. Currently, 21 wells exist on the Gray Lodge WA, and five wells on the Sutter NWR. The wells on the Sutter NWR have not been used because of poor water quality (elevated levels of arsenic and mercury) and high operation and maintenance costs. The wells on the Gray Lodge WA have been used as necessary to supplement surface- water supplies. Groundwater use has varied from 2,605 ac-ft in water year 1993 to 16,158 ac-ft in water year 1994. Although the amount of groundwater withdrawal varies, approximately 40 percent of Gray Lodge's supply comes from on-refuge wells. This represents approximately 14,000 ac-ft (Reclamation, 1995). Off-refuge use of groundwater for agricultural and urban uses is limited, because such uses generally rely on surface water for their supplies (Reclamation, 1994).

Drainage. The primary drainage features for water eventually draining to the Sacramento River within the study area are the East and West Borrow Ditches of the Sutter Bypass. The Sutter Bypass intercepts water from agricultural and residential drains, in addition to natural stream courses, before emptying into the Sacramento Slough and ultimately the Sacramento River near Verona. During the winter months, the Sutter Bypass drains stormwater runoff and is used to divert flows from the Sacramento River during potential flood events (Service, 1992). Current return flows for the Sutter NWR are estimated to be 2,820 to 6,345 (Service, 1995). Return flows for Gray Lodge WA are not known.

Water Quality. Water from the Feather River, Thermalito Afterbay and subsequent delivery canals and systems is adequate for refuge and agricultural uses (Reclamation, 1994). For example, this surface water is widely used for drinking water after disinfection, and supports sensitive anadromous fish. The SEWD and BWGWD conveyance canals receive some agricultural return flow, but water quality remains adequate for refuge and agricultural uses. This is demonstrated by its current, successful use for irrigation of agricultural fields and wildlife habitat. Groundwater quality evaluations conducted by Reclamation in 1988 on the Sutter NWR wells found elevated levels of mercury in quantities 25 to 50 times the U.S. Environmental Protection Agency (EPA) chronic criterion for freshwater aquatic organisms as well as trace concentrations of arsenic in exceedance of the same EPA criterion (USGS, 1992). Studies conducted by the USGS reported elevated levels of some constituents at a few spot locations; however, these levels were only slightly greater than Service guidelines for possible effects on wildlife.

Environmental Consequences

The total additional quantity of water above Level 2 required to achieve Level 4 supplies for the East Sacramento Valley study area is 15,100 ac-ft. This water would be acquired through willing sellers and conveyed through either new facilities, or via a water district's existing facilities as described in Chapter II and below.

Criteria for Determining Significance. Impacts to hydrology and water quality would be considered significant if they result in any one of the following:

- Substantial degradation of water quality
- Contamination of a public water supply
- Substantial degradation or depletion of groundwater resources
- Substantial interference with ground water discharge

Hydrology and water quality impacts and mitigation measures are summarized in Table IV-22.

Table IV-22
Hydrology and Water Quality Impacts and Mitigation Measures

Impact	Mitigation	Level of Significance After Mitigation
HWQ-1 Alternatives SUT-8 and SUT-9 would temporarily disturb streambeds.	HWQ-1 Schedule construction within the banks of all streams during the dry season when these channels have reduced flows. HWQ-2 Develop and implement an erosion control and restoration plan that identifies methods to minimize sedimentation during construction. HWQ-3 Reclamation is currently proposing to bore under East Borrow Ditch. This method would result in no impacts to water quality.	LS

LS = Less than significant

Surface Water. Construction of any of the conveyance alternatives for the two refuge areas would have no effect on Feather River or Thermalito Afterbay water quality. Impacts to water quality are not anticipated for the construction of any of the Gray Lodge WA alternatives because no stream courses will be crossed. Impacts would be limited to the short-term during the construction of facilities associated with the Sutter NWR:

- SUT-8. East Borrow Ditch (although an artificial channel, known to contain spring-run chinook salmon)

- SUT-9. Same as SUT-8

Impacts from installation of a pipeline across East Borrow Ditch would require disturbing the streambed, resulting in increases in turbidity and the generation of sediment. This impact would be considered significant because of potential impact to beneficial uses, such as the fishery.

Groundwater. Impacts to groundwater are not anticipated from the construction of any of the facilities because disturbance will be short-term and will generally be limited to activities above the ground water aquifer. Implementation of alternative GRA-1 or GRA-3 would result in beneficial impacts in terms of groundwater demands because all supplies would come from surface sources, negating the need for the current typical 14,000 ac-ft amount. Implementation of alternative GRA-9 would require that 5,300 ac-ft of groundwater be pumped during the winter months, which is less than the current 14,000 ac-ft amount. This would be a beneficial impact. No mitigation would be required for any of the alternatives.

Drainage. Increasing flows from Level 2 to Level 4 are anticipated to increase drainage from the Sutter NWR by 1,500 ac-ft, for a total of 4,320 to 7,845 ac-ft (Service, 1995). Drainage flows at Gray Lodge WA are expected to increase as well due to the additional Level 4 increment of approximately 8,600 ac-ft of water applied to the refuge.

This increase in drainage is not expected to impact water quality, as on-refuge levels of trace elements and pesticides are within acceptable levels from established criteria.

Water Quality. Potential impacts to water quality are discussed above under Surface Water, Groundwater, and Drainage.

Mitigation

The following mitigation measures (labeled HWQ for Hydrology and Water Quality) are incorporated as part of each alternative and will reduce impacts identified above to a less than significant level:

- HWQ-1. Schedule construction within the banks of all streams listed above within the dry season when these channels have reduced flows, or as specified by the Department and/or COE when obtaining permit approvals from these agencies. Isolate flows to the extent possible to minimize downstream siltation.
- HWQ-2. Develop and implement an erosion control and restoration plan that identifies methods to minimize sedimentation during construction in addition to slope stabilization and revegetation techniques. This plan should be prepared in coordination with the Department and COE.
- HWQ-3. Reclamation is currently proposing to bore under the East Borrow Ditch. This method would result in no impacts to water quality.

Recreation

Affected Environment

Recreational opportunities in the vicinity of the refuges include hunting, nature viewing, fishing, and water-related activities. Within the study area, the Sacramento River traverses the Sacramento Valley, offering a large variety of recreational venues. Private hunting clubs are scattered around the perimeter of the refuges and are heavily used. Recreational opportunities exist at Shasta, Trinity, Folsom, and other CVP reservoirs. Other forms of recreation are somewhat limited because of a lack of public land and extensive agricultural land use (Reclamation, 1994).

Environmental Consequences

Criteria for Determining Significance. Impacts to recreation would be considered significant if they resulted in the following:

- Introducing conflicts with established recreational uses of the area
- Conflicts with local or regional recreation management plans

Recreation impacts and mitigation measures are summarized Table IV-23.

Recreational opportunities along the Sacramento River and local reservoirs would not change because of the delivery of additional water to wetland habitat areas via any of the conveyance alternatives. No impact would occur.

Recreational uses at the refuges will be enhanced, if not increased, as a secondary benefit of the improved marsh management described in Chapter II. The increase in summer water/permanent pond habitat during the summer period when wetlands (and associated wildlife) available for viewing are scarce, the earlier flood-up extending the prime wildlife-viewing season, and the increase in wetland habitat will enhance/increase recreational uses (wildlife observation). Waterfowl hunting may be expanded on new wetland acres, pending consideration of compatibility issues, management planning, etc.

Table IV-23 Recreation Impacts and Mitigation Measures		
Impact	**Mitigation**	**Level of Significance After Mitigation**
	No mitigation is required.	
S = Significant LS = Less than significant SU = Significant, Unavoidable		

Recreational opportunities at Sutter NWR and Gray Lodge WA are expected to increase because more water would be available for refuge uses. With the increased availability of water, refuge managers would be able to flood earlier in the year than current conditions allow. Ponds would remain wet for a longer period of time, allowing for increased habitat and species diversity, with a resultant increase in wildlife populations. With improved predictability of habitat, the number of visitors is anticipated to increase by anywhere from 10 to 25 percent (Service, 1995; Department, 1995c).

Mitigation

No mitigation is required.

Socioeconomics

Affected Environment

The socioeconomic environment for this EA/IS encompasses the counties of Butte, Sutter, and Yuba. The study area is essentially rural in nature, with the major urban areas being Chico, Yuba City, and Marysville. The primary industry is agriculture.

Outdoor Recreation. As described in the Recreation section, recreational opportunities vary from on-refuge hunting and nature viewing to off-refuge hunting and recreation associated with local reservoirs and the Sacramento River. On-refuge recreational use contributes primarily to the local economies of Yuba City, Marysville, and Colusa, through purchases of supplies, food, and lodging. Expenditures tend to be highest during the fall and winter in conjunction with duck hunting. Hunting is also a key off-refuge recreational use because of the number of private hunting clubs in the area. The majority of the remaining recreational use is focused on local reservoirs and the Sacramento River, where expenditures are generated through fishing, boating, and camping opportunities.

Environmental Consequences

Criteria for Determining Significance. Impacts to the socioeconomic environment would be considered significant if they result in any one of the following:

- Induce substantial growth or concentration of population
- Substantially impact local housing supplies
- Substantially impact local health and safety by exceeding or degrading local public service capabilities
- Substantially impact the regional agricultural economy in the short or long term

Socioeconomic impacts and mitigation measures are summarized in Table IV-24.

Table IV-24 Socioeconomic Impacts and Mitigation Measures		
Impact	**Mitigation**	**Level of Significance After Migration**
	No mitigation is required.	
S = Significant LS = Less than significant SU = Significant, Unavoidable		

Recreation. If additional water supplies result in increased use by waterfowl, implementation of any of the alternatives associated with the three refuges would result in a long-term beneficial socioeconomic impact. Increased numbers of waterfowl would translate to increased opportunities for wildlife viewing and hunting, with resultant increases in expenditures on supplies, lodging, and food within the local economy.

Construction. Alternatives that would require construction of major pipeline or canal facilities such as GRA-1, GRA-9, SUT-8, and SUT-9 would require a local or regional contractor to install the necessary facilities. The construction effort would likely result in local expenditures in terms of lodging, food and construction-related materials and equipment purchases. Alternative SUT-10 would also generate beneficial impacts in terms of increased local spending, but most likely to a lesser degree because of the relatively minor improvements required.

Energy

Affected Environment

This EA/IS encompasses the counties of Butte, Sutter, and Yuba with respect to energy. The study area is essentially rural in nature, with the major urban areas being Chico, Yuba City, and Marysville. The primary industry is agriculture.

The two refuges within the East Sacramento Valley are currently served by Pacific Gas and Electric. The Sutter NWR has on-refuge wells, but these currently are not used because of poor water quality and the expense involved in pumping. Groundwater wells are used to supplement CVP supplies at Gray Lodge WA. Energy is required to pump CVP water to Sutter NWR and to pump groundwater at Gray Lodge WA.

The conveyance of water throughout the CVP system requires a great deal of power associated with electrical pumping. Large-scale pumping occurs at various located along the CVP, including the Delta. Hydropower facilities generate power from reservoir releases at the CVP Shasta, Trinity, and Folsom Dams. Water-year conditions and

CVP operating criteria may necessitate changes to reservoir releases, and these changes can affect reservoir operations and power generation potential.

Environmental Consequences

Implementation of the proposed action would provide additional CVP supplies to the refuges compared with the No-Action alternative. This is a small increase in the total water available to the refuges. The delivery of this supplemental CVP water is not expected to affect the yield of the CVP or CVP storage in an amount that could impact power generation or use significantly. On-refuge power use at the Gray Lodge WA would decrease significantly with the implementation of GRA-1 and GRA-3 because groundwater pumping would no longer be required. Alternative GRA-9 would still

require some degree of pumping but less than what is occurring under the No-Action alternative. Therefore, impacts to energy consumption would be beneficial under all Gray Lodge WA alternatives. Impacts to energy consumption related to the Sutter NWR alternatives would not occur because none of the alternatives, including No-Action, incorporates groundwater pumping.

Energy impacts and mitigation measures are summarized in Table IV-25.

Mitigation

No mitigation is required.

Air Quality

Air quality data are discussed in terms of defined air basins and focus on federal and state criteria pollutants. The East Sacramento Valley basin area lies within the Sacramento Valley Air Basin (SVAB) under the jurisdiction of the Sacramento Metropolitan Air Quality Management District (SMAQMD). The two counties within the study area, Butte and Sutter, are currently designated as nonattainment areas for the state ambient air quality standards for ozone and PM10. As such, the potential for the proposed action to significantly contribute to criteria pollutant levels (i.e., particulates, by way of disturbance to fallowed fields currently in nonattainment) will be addressed.

Affected Environment

The two refuges are located within the SVAB, which is bordered by mountain ranges to the east, west, and north and is subject to frequent temperature inversions that restrict vertical mixing in the atmosphere. As a result, conditions frequently occur that can lead to the buildup of air pollutants. In addition, the clear skies and warm temperatures typical of the summer months promote the formation of ozone.

Because of the rural nature of the region, the attainment status of Butte and Sutter Counties has not been classified for many state and federal criteria pollutants. Criteria pollutants include ozone, carbon monoxide (CO), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), and particulate matter less than 10 microns (PM10). Federal and state standards have been established for each of these pollutants by the EPA and the California Air Resources Board (CARB), respectively. Butte and Sutter Counties are currently designated as nonattainment areas for the state ambient air quality standards for ozone and PM10.

Table IV-25
Energy Impacts and Mitigation Measures

Impact	Mitigation	Level of Significance After Migration
	No mitigation is required.	

S = Significant
LS = Less than significant
SU = Significant, Unavoidable

Environmental Consequences

Criteria for Determining Significance. Impacts to air quality would be considered significant if they resulted in any one of the following:

- Violation of any ambient air quality standard
- Substantial contribution to an existing or projected air quality violation
- Exposure of sensitive receptors to substantial pollutant concentrations

Air quality impacts and mitigation measures are summarized in Table IV-26.

Impact on air quality as a result of implementing the preferred alternative would be insignificant. Vehicle-related emissions would not change as a result of project implementation. Agricultural land would not be fallowed because of the proposed action; therefore, dust emissions would not change. Therefore, although the area is currently at nonattainment for PM10, contributions to PM10 levels are expected to be insignificant.

Mitigation

No mitigation is required.

Table IV-26
Air Quality Impacts and Mitigation Measures

Impact	Mitigation	Level of Significance After Migration
Fugitive dust associated with temporary construction activities is not expected to significantly contribute to PM10 levels in the project vicinity.	No mitigation is required.	

S = Significant
LS = Less than significant
SU = Significant, Unavoidable

Chapter V
Cumulative and Growth-Inducing Impacts

Cumulative Impacts

Cumulative impacts are effects that may be individually minor at a project level, but collectively can result in greater effects when considered in relation to other related past, present, and foreseeable future projects. This discussion focuses on the cumulative impacts associated with the development of conveyance facilities necessary to deliver Level 4 water supplies to the refuge areas. The PEIS will address the system-wide impacts associated with implementation of the Refuge Water Supply requirements of the CVPIA, including the acquisition of Level 4 water supplies. The expected impacts of acquiring Level 4 supplies will also be subsequently addressed in greater detail in a separate environmental document.

In general, the impact areas are dominated by agricultural uses and are anticipated to remain in agricultural use in the long-term. The implementation of any of the action alternatives would result in both beneficial and adverse impacts. As described previously, all adverse impacts can be mitigated to a less than significant level. Adverse impacts were identified within the following resource categories:

- Biological Resources (primarily short-term impacts to habitats, some of which could be used by endangered species)
- Water Quality (primarily short-term impacts from the construction of conveyance facilities across or adjacent to existing stream courses)
- Land Use (primarily short-term impacts associated with installation of facilities through prime agricultural lands)

The installation of conveyance facilities to each of the refuge areas will result in short-term impacts to habitats used by a number of species, including species that are listed as threatened or endangered by the Service and Department. Generally limited long-term impacts could also occur where facilities resulted in a permanent encumbrance, such as a canal. As described in Chapter IV, Interior will route all facilities so as to minimize all impacts to sensitive habitats and will mitigate all impacts where avoidance is not possible. Mitigation measures include revegetation and monitoring at replacement ratios determined reasonable for each type of habitats. In addition to avoidance and mitigation where avoidance is not feasible, the overall action will result in a number of wildlife and vegetation benefits on each of the refuges. Increased water supplies will allow for the development of additional habitat, as well as ensure the maintenance of habitats that cannot currently be maintained during dry periods. Accordingly, potential cumulative negative effects to biological resources are considered minor, and the cumulative effects in general would be beneficial.

Adverse contributions to regional water quality are also considered to be insignificant, because of the generally short-term nature of the construction period and the extremely small potential contribution to water quality turbidity and overall quality. Mitigation, including the development of an erosion control and restoration plan, will ensure that there are essentially no adverse impacts to water quality in a cumulative sense.

Impacts to land use are primarily limited to short-term disturbances to agricultural land. Alternatives that include permanent facilities, such as a canal, would result in permanent impacts. Routing of conveyance facilities to avoid agricultural impacts, to the extent possible, will lessen impacts. Short-term disturbances will lessen overall productivity for

approximately one year. These short-term impacts will not result in any noticeable cumulative effects.

Growth-Inducing Impacts

Growth-inducing impacts are defined in Section 15125(g) of the CEQA Guidelines as "the ways in which the proposed project could foster economic or population growth, or the construction of additional housing, either directly or indirectly, in the surrounding environment." The proposed alternatives will result in some economic activity during construction in terms of a temporary demand for labor, building materials, and a limited degree of lodging. These short-term economic benefits will not result in significant growth-inducing economic or population growth, or the need to provide additional new housing.

Chapter VII
Consultation and Coordination

List of agencies and organizations consulted:

- California Department of Fish and Game
- U.S. Fish and Wildlife Service, Ecological Services
- U.S. Army Corps of Engineers
- Natural Resources Conservation Service
- Central Valley Regional Water Quality Control Board

This EA/IS has been prepared so as to comply with the environmental review and consultation requirements of the NEPA and the CEQA. Compliance with specific environmental review and consultation requirements to implement the proposed action are identified in Table VI-1.

Table VII-1
Review, Permits, and Licenses Required for the Conveyance of Refuge Water Supply

Agency	Act or Regulation	Requirement	Compliance Procedure
U.S. Army Corps of Engineers/State Water Resources Control Board	Section 402 national Pollutant Discharge Elimination System/General Construction Activity Stormwater Permit	Project requiring disturbance to greater than five acres	Obtain permitting approval; agencies review NEPA/ CEQA document as part of process
U.S. Army Corps of Engineers/Regional Water Quality Control Boards	Section 401 Water Quality Certification	Work accomplished requiring discharge to surface waters	Obtain permitting approval; agencies review NEPA/ CEQA document as part of process
U.S. Army Corps of Engineers/California Department of Fish and Game	Section 404 Wetlands Permit under the Federal Clean Water Act Executive Order 11990 Protection of Wetlands	Possible dredge and fill permits for pipeline crossings; Notice coordination	Obtain permitting approval; agencies review NEPA/ CEQA document as part of process
Environmental Protection Agency (EPA)	NEPA; Clean Water Act; Clean Air Act	Compliance with relevant federal environmental laws.	Agency reviews Draft and Final EA/IS
U.S. Fish and Wildlife Service	Endangered Species Act	Compliance with provisions of the Act.	ESA Section 7 consultation; agency reviews Draft and Final EA/IS.
Department of Fish and Game	Streambed Alteration Agreement under Section 1601 of the Department Code	Alteration to a stream channel	Obtain agreement approval; agency reviews NEPA/ CEQA document as part of process
Department of Fish and Game	California Endangered Species Act (CESA)	Compliance with provisions of CESA	Aency reviews proponent's submittals; prepares Biological Opinion
Advisory Council on Historic Preservation	NHPA, Sec 106; EO 11593, Sec2 (b)(36 CFR 800)	Compliance with provisions of the Act and Executive Order.	State Historic Preservation Office review of environmental document/ coordination

Fish and Wildlife Coordination Act

The Fish and Wildlife Coordination Act (FWCA) requires Reclamation to consult with the Service before undertaking projects that control or modify surface water (water projects). This consultation is intended both to promote the conservation of wildlife resources by preventing loss of or damage to wildlife resources and to provide for the development and improvement of wildlife resources in connection with water projects. Federal agencies undertaking water projects are required to include in project reports recommendations made by the Service, to give full consideration to these recommendations, and to include in project plans justifiable means and measures for wildlife purposes.

Reclamation contacted the Service and the Department about the need for a formal Section 2(b) FWCA Report for the project. The Service and the Department determined that formal FWCA consultation is not required for the project. The Service and the Department, as project participants, reviewers and commentors, ensure that FWCA interests are fully addressed at part of the project formulation and ongoing cooperative efforts. Technical memorandums to the official project files have served the purpose of information tracking. Reclamation, the Service, and the Department are closely coordinating several ongoing activities associated with the CVPIA.

Endangered Species Act

Reclamation and the Service are closely coordinating several ongoing activities associated with the CVPIA. The ESA (federal and state) protects species that have been listed or proposed for listing as threatened or endangered. The Service and the Department have been directly involved regarding special-status species for this EA/IS. Past ESA compliance activities have occurred since 1991 and include:

- Implementation of biological opinions for specific activities of the CVP
- Consultations on future activities
- Consultations addressing the CVP contract service areas

Reclamation and the Service are continuing this close coordination for ESA compliance, with more recent activities associated with the CVPIA PEIS. For this EA/IS, endangered species protections include compliance with the ESA, including the 1994 Service Biological Opinion for the Delta Smelt and the 1993 Biological Opinion for the winter-run chinook salmon.

Other protections require refuge managers to comply with Service and NWR policies. These policies require that refuge managers review water and/or habitat management programs to determine any possible impacts on endangered, threatened, or candidate species annually. This review allows managers to determine if water allocations would result in the adverse impacts to special-status species.

Cultural Resources Coordination

During the preparation of this EA/IS, CVP Environmental Team staff consulted with Reclamation regarding the potential impacts on cultural resources resulting from implementation of the proposed action.

Procedures for complying with Section 106 of the National Historic Preservation Act are specified in 36 CFR 800. The analysis presented in this EA/IS serves as an overview and initial study to determine the parameters of potential impact to historic resources. Prior to construction of the selected alternative, the following steps will be needed to satisfy the regulations:

- Identify an area of potential environmental effect (APEE) for the project.
- Field survey any areas in the APEE that were not examined in the current project, and record and formally evaluate all resources in the APEE.
- Produce a technical report on the findings of the above, including recommendations for mitigation, if necessary.
- If no significant cultural resources are located in the APEE and if Reclamation and SHPO concur in this finding, this completes the Section 106 process. If a significant property is located in the APEE and an adverse impact is determined, consult with the ACHP, SHPO, and other parties, as necessary.

Indian Trust Assets

Indian Trust Assets (ITA) are legal interests in property or rights held in trust by the United States for Indian Tribes or individuals. Trust status originates from rights imparted by treaties, statutes, or executive orders. These rights are reserved for or granted to tribes. A defining characteristic of an ITA is that such assets cannot be sold, leased, or otherwise alienated without federal approval.

Indian reservations, rancherias, and allotments are common ITAs. Allotments can occur both within and outside of reservation boundaries and are parcels of land where title is held in trust for specific individuals. Additionally, ITAs include the right to access certain traditional use areas and perform certain traditional activities. No reservations occur within the wetland habitat areas and therefore would not be affected by implementation of any of the conveyance alternatives.

Coordination with Water Purveyors

Meetings were held with each of the potential water purveyors to field verify system cpacities and obtain direct input on proposed alternatives. This input was incorporated into the alternative selection process to ensure that all reasonable alternatives were evaluated.

Public Involvement Activities

Reclamation, in cooperation with the Service, held informal public meetings in Willows, Sacramento, Tulare, and Santa Nella, California. The meetings were held to inform the public about the preparation of the EAs and to elicit public comments for preparation of the EA/ISs. Written and verbal comments from these meetings were considered in preparation of this EA/IS, as summarized at the end of this chapter. Reclamation also conducted an intensive public review prior to the public meetings to elicit comments for the EA analyses from a number of selected federal, state, local agencies, and water districts. These entities were selected based on their interest and participation in the ongoing public involvement program for the PEIS as well as refuge water supply specific concerns.

Summary of Public Comments

Public comments received during the scoping meetings held in early June 1995 focused primarily on water quantities and source, as well as use and quality. Concerns over potential impacts to groundwater were strongest in the San Joaquin Valley because of the area's historic groundwater concerns and increased use. In general, the public requested a thorough and objective review of all potential impacts to on- and off-refuge uses, in terms of environmental and social issues. Comments ranged from a desire that impacts to all endangered species in the project vicinity be disclosed to concerns over water quality impacts in the Delta. It was also requested that

state facilities be utilized wherever possible to supplement the CVP. A summary of the primary comments is listed in Chapter I under Project Scoping. A complete record of comments raised at the scoping meetings is available from Reclamation. Each of these issues is discussed in this EA/IS.

Environmental Justice

Executive Order 12898 requires each federal agency to achieve environmental justice as part of its mission, by identifying and addressing disproportionately high and adverse human health or environmental effects, including social and economic effects, of its programs, policies, and activities on minority populations and low-income populations of the United States. Reclamation has determined that none of the conveyance alternatives would disproportionally impact minority or low-income populations. Impacts identified in the Socioeconomic section of Chapter IV are generally anticipated to be beneficial, in addition to being shared across income levels.

Farmlands Policy

Council on Environmental Quality (CEQ) memorandums to heads of Agencies, dated August 30, 1976, and August 11, 1980, and The Farmlands Protection Policy Act of 1981 require agencies for this environmental document to include farmlands assessments designed to minimize adverse impacts on prime and unique farmlands. As described in the Land Use section of Chapter IV, the proposed project would have no adverse impacts on farmlands. Reclamation will work directly with all affected landowners to compensate for any short-term or long-term impacts.

Executive Order 11988, Floodplain Management

Executive Order 11988 requires federal agencies to prepare floodplain assessments for proposals located within or affecting floodplains. If any agency proposed to conduct an action within a floodplain, it must consider alternatives to avoid adverse effects and incompatible development. If the only practicable alternative involves siting in a floodplain, the agency must minimize potential harm to or within the floodplain and explain why the action is proposed within the floodplain. No impacts are anticipated to floodplain areas.

Executive Order 11990, Protection of Wetlands

EA 11990 requires federal agencies to prepare wetlands assessments for proposals located within or affecting wetlands. Agencies must avoid undertaking new construction located in wetlands unless no practicable alternative is available and the proposed action includes all practicable measures to minimize harm to wetlands. Impacts to wetland areas are anticipated to be relatively minor and short term in nature. Impacts which may occur will be mitigated as identified under the Biological Resources section of Chapter IV.

Clean Water Act

Any person or public agency proposing to locate a structure, excavate, or discharge dredged or fill materials into water of the United States must obtain a 404 Permit from the COE. Under Section 404 of the Clean Water Act, the COE's jurisdiction over navigable waters has been expanded to include rivers, coastal waters, adjacent wetlands, lakes, intermittent streams, and low lying areas behind dikes along the coast. Improvements requiring work within streams or wetlands regulated by the COE will require a 404 Permit.

Clean Air Act

The Clean Air Act requires the Environmental Protection Agency (EPA) to publish national primary standards to protect public health and more stringent national secondary standards to

protect public welfare (40 CFR 50). States and local governments are to be responsible for the prevention of air pollution. The proposed project will not adversely affect existing air quality.

Chapter VIII
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Chapter IX
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Technical Appendix
Alternatives Screening Process
East Sacramento Valley Study Area

This technical appendix provides a detailed discussion of the screening process used in selecting the recommended alternatives for the refuges in the East Sacramento Valley area. A brief description of the overall project, screening criteria, and a summary of the alternatives is provided.

Background

The initial development of alternatives was based, in part, on the previous studies completed by Reclamation regarding refuge water supply. Four primary investigations were considered in the initial development of alternatives:

- *Report on Refuge Water Supply Investigations, Central Valley Hydrologic Basin, California,* 1989
- *San Joaquin Basin Action Plan/Kesterson Mitigation Action Plan Report,* 1989
- *Refuge Water Supply Study, Plan Coordination Team Interim Report,* 1992
- *Refuge Water Supply, Proposed Plan of Study Report,* 1993

In addition to the alternatives presented in these investigations, the study team developed additional alternatives for consideration. These alternatives generally involved conjunctive use of groundwater resources to the extent possible, and alternative conveyance routing options.

Public involvement meetings were held with interested parties for conveyance of refuge water supplies. A key objective of these meetings was to preview the alternatives being considered for the investigation, receive input and comments on these alternatives, and solicit additional alternatives for consideration. In some instances, additional alternatives were forthcoming from the public involvement meetings. These alternatives were included in subsequent evaluations.

Following the development of the alternatives for each refuge using the process described above, an initial screening process was employed. This initial screening process was used to eliminate from further consideration any alternatives that had fatal flaws, resulting from either excessive costs, unreasonable engineering requirements, or unacceptable environmental impacts. Following initial screening of the alternatives, remaining alternatives were developed to the same level of detail and analyzed in the EA/IS.

A number of agency workshops, discussions with water purveyors, and scoping meetings were held in early June 1995. During these workshops and meetings, the alternatives presented in the EA/IS were determined to be feasible in terms of accomplishing the purpose and need of the proposed action. The process used to determine feasibility and the results of these investigations are presented in the April 1995 Decision Document. Additionally, Reclamation and the Service further refined the alternatives selected in the Decision Document in a May 1995 document titled *Refuge Water Supply Conveyance Alternatives Refinement Memorandum* (Memorandum). The EA/IS analyzes alternatives that were determined feasible as presented in the Memorandum. It evaluates the potential environmental impacts of implementing any of the proposed alternatives to each refuge, in addition to discussing the anticipated social and institutional constraints.

Recommended Alternatives

Selection of recommended alternatives for the conveyance of refuge water supplies for each refuge area was based on input from Reclamation, Service, and Department staff, including staff from each of the refuge areas. To guide and document the selection process, it was determined that a number of factors should be identified, which could be used for any of the refuge areas and weighted according to the relative importance. The following six factors were identified (the proportionate weighting factor is indicated in parenthesis) as best capturing the primary issues:

- Water supply reliability (30)

  Relative ability of an alternative to provide increased water supply reliability, including the benefits of multiple sources or conveyance facilities.

- Water quality (15)

  Overall water quality expected to be delivered by the alternative, including the potential for degradation due to upstream sources.

- Environmental issues (20)

  Relative potential impacts to special status species, including both short-term (construction related) and long-term impacts.

- Cost-effectiveness (20)

  Relative comparison of estimated life-cycle costs for each alternative, including initial capital costs, operations and maintenance costs, wheeling costs, and additional costs for water losses.

- Implementation (10)

  Relative ease of implementation, including potential impacts on existing agencies, permitting issues, safety, and land use.

- Engineering (5)

  Relative engineering aspects of alternatives, including increased system integrity resulting from new facilities and changes in current operations and maintenance functions by refuge management staff.

The weighting factors identified above were identified based on determining the relative importance of each factor. It was determined that the reliability of supplies was the most important factor, and was therefore weighted highest. Environmental issues and cost-effectiveness were ranked next most important and equal amongst themselves. Water quality was determined to be the third most important factor, in part because the quality of water which would be conveyed to each of the refuges is generally good. Implementation and engineering concerns were also felt to be of sufficient importance to warrant including them as separate factors.

Using these six factors and weighting approach, matrices were created to rank each of the alternatives addressed in detail in the EA/IS. Each of the alternatives was compared to one another and given a impact level score of between one and ten for each of issues. For example as shown on Table 1 under water supply reliability, the SUT-8 alternative was given a numerical score of 9, compared to SUT-10, which was given a score of 7. The weighted impact scores for these two alternatives under water supply reliability were 270 and 210 respectively, because of the weighting factor of 30 given to the water supply reliability factor. The recommended alternative was the alternative that received the highest overall score when summing the six selection factors, as shown in Table 1. Following is a summary of the alternative selection process for Sutter NWR and Gray Lodge Wildlife Area (WA) in the East Sacramento Valley.

Sutter National Wildlife Refuge

Following are the three alternatives under consideration for the Sutter NWR:

- SUT-8—Use existing canals from Thermalito Afterbay; construct new pipeline from Sutter Extension Canal
- SUT-9— Use existing canals from Thermalito Afterbay; construct new pressure pipeline from Sutter Extension Canal
- SUT-10—Use existing canals; enlarge Farrington Lateral; modify existing siphons

A siphon under the east bypass levee and the East Borrow Ditch is incorporated in all alternatives to lessen potential impacts to fish resources. The current delivery system uses the East and West Borrow Ditches of the Sutter Bypass and essentially relies on agricultural return flows in the summer and rainfall runoff in the winter; the bypass is considered an unreliable water source.

Water Supply Reliability

Pipelines associated with Alternatives SUT-8 and SUT-9 were determined to be the most reliable; the pressure pipeline (SUT-9) is slightly less reliable because of the potential for failure. Alternative SUT-10 was ranked lowest because facilities for the entire alternative are subject to water theft.

Table 1

Draft Criteria Evaluation Table--Sutter National Wildlife Refuge

Factors	Weighting Factor	SUT 8 Impact Level	SUT 8 Weighted Impact	SUT 8 Comments	SUT 9 Impact Level	SUT 9 Weighted Impact	SUT 9 Comments	SUT 10 Impact Level	SUT 10 Weighted Impact	SUT 10 Comments
Water Supply Reliability	30	9	270	Most reliable alternative because of pipeline which reduces potential for theft	8	240	Second most reliable, reduces theft potential, but more prone to operations and maintenance-related shutdown because of pump station	7	210	Least reliable because of greatest potential for theft
Water Quality	15	9	135	Reduced potential for agricultural return flow co-mingling because of pipeline	9	135	Same as SUT-8	8	120	Water quality assumed to be good, but would allow for greatest potential for return flow co-mingling
Environmental Issues	20	6	120	Temporary impacts from construction of a lengthy pipeline	6	120	Same as SUT-8	8	160	Least construction involved - new/replace existing siphons
Cost-Effectiveness	20	5	100	Capital expense associated with constructing pipeline	5	100	Same as SUT-8	9	180	Least expensive due to relatively few improvements required
Implementation	10	4	40	Acquisition of right-of-way for pipeline seen as a major implementation constraint	4	40	Same as SUT-8	8	80	Few right-of-way permitting issues because of limited facility improvements required
Engineering Issues	5	7	35	Design issues, gravity system	5	25	Ranked lowest because of operation and maintenance concerns with pressure pipeline	8	40	Fewest issues because of fewest improvements required
	100		700			660			790	

Impact Level — Range from 1 to 10, with 1 being most negative impact

Water Quality

All three alternatives are similar in the water quality category. Alternatives SUT-8 and SUT-9 are considered to be slightly higher because of pipelines and resultant less opportunity for co-mingling with agricultural return water.

Environmental Issues

Alternatives SUT-8 and SUT-9 would have the same amount of impact. Both alternatives would have greater temporary impacts than Alternative SUT-10 because of the pipelines.

Impacts associated with Alternative SUT-10 would be limited primarily to the construction of new siphons.

Cost-Effectiveness

The present value capital costs and annualized costs between alternatives were reviewed as shown in Table 2.

Implementability

The acquisition of right-of-way for pipelines was included as part of Alternatives SUT-8 and SUT-9 and viewed as a major implementation constraint. Alternatives SUT-10 ranked highest and has fewer right-of-way and permitting issues.

TABLE 2
Present Value Capital and Annualized Costs

Alternative	Capital Cost Millions of ($)	Annual Cost Thousands of ($)	Cumulative Annual Cost - Millions of ($)	Total Millions of ($)
SUT-8	13.1	290	3	16
SUT-9	12.4	350	3	15.3
SUT-10	2.1	290	3	4.9

Engineering Issues

Alternative SUT-9 ranked lowest because of operation and maintenance concerns with the pressure pipeline. Alternative SUT-10 would require limited maintenance; SUT-8 was not ranked as high but higher than SUT-9 because of gravity system.

Summary

Alternative SUT-10 ranked highest primarily because of cost and implementability. Alternatives SUT-8 and SUT-9 were ranked similarly. Table 1 provides a summary of the screening process used in selecting a recommended alternative.

As noted in the following discussion for the Delevan National Wildlife Refuge, some of the alternatives developed for the Sacramento NWR are applicable to joint alternatives for Delevan. This potential synergy between joint alternatives for the two refuges was con-

sidered by the project team in the selection of alternatives for the Delevan NWR. That process is discussed below.

Gray Lodge Wildlife Area

Following are the four alternatives under consideration for the Gray Lodge WA:

- GRA-1—Construct new pipeline from Thermalito Afterbay
- GRA-3—Construct new canal from Thermalito Afterbay
- GRA-9—Utilize Biggs-West Gridley (BWGWD) facilities with improvements
- GRA-14—Utilize Butte Water District (BWD) facilities with improvements

Reliability

Alternatives that are directly connected to the Thermalito Afterbay (GRA-1 and GRA-3) are considered most reliable. GRA-9 is considered less reliable because of reliance on WD (BWGWD) GRA-14 viewed as slightly higher based on aggressiveness of BWD to enter into an agreement. Well use is required for both GRA-9 and GRA-13.

Water Quality

Water quality would be highest for GRA-1 and GRA-3 as water would be conveyed directly from the Thermalito Afterbay and would be isolated from agricultural return flows. GRA-9 and GRA-13 are both open systems (potential for agricultural return flow interaction). GRA-13 rated slightly lower because of the perception that a greater potential exists for return flow conflicts.

Environmental Issues

Greatest impacts associated with GRA-3 because of the distance of the canal and permanent impacts. Pipeline included in GRA-1 would impact same distance, but impacts would be temporary. Not much difference seen between GRA-9 and GRA-14, GRA-14 ranked slightly lower because of the additional riparian impacts.

Cost-Effectiveness

The present value capital costs and annualized costs between alternatives were reviewed as shown in Table 3.

Implementability

It was assumed that GRA-3 would be most difficult to implement given great deal of right-of-way that would have to be obtained, and permanent encumbrance. GRA-1 was next most difficult, but impacts will be temporary. GRA-9 and GRA-14 ranked higher than these two, but equal to each other. GRA-9 viewed as continuation of current operations. Gray-14 would require additional improvements and would rely on BWGWD & BWD providing primary and secondary water.

TABLE 3
Present Value Capital and Annualized Costs

Alternative	Capital Cost Millions of ($)	Annual Cost Thousands of ($)	Cumulative Annual Millions of ($)	Total Millions of ($)
GRA -1	27.7	50	0.3	28
GRA-3	11.5	115	1.0	12.7
GRA-9	.4	360	3.7	4.1
GRA-14	3.5	140	1.5	5

Engineering Issues

No great differentiation; GRA-1 was rated highest because pipeline would be relatively easy to design. GRA-3 tied with GRA-14 for lowest; GRA-3 would involve more difficult canal design; anticipate operation and maintenance issues with GRA-14.

Summary

GRA-9 and GRA-14 are essentially tied for highest ranking. Gray Lodge staff and recognizes that the majority of the required conveyance system is in place and wheeling agreement would be with a single party. Accordingly, GRA-9 was selected as the recommended alternative. Table 4 provides a summary of the screening process used in selecting a preferred alternative.

Table 4

Draft Criteria Evaluation Table--Gray Lodge Wildlife Area

Factors	Weighting Factor	GRA-1			GRA-3			GRA-9			GRA-14		
		Impact Level	Weighted Impact	Comments	Impact Level	Weighted Impact	Comments	Impact Level	Weighted Impact	Comments	Impact Level	Weighted Impact	Comments
Water Supply Reliability	30	9	270	Ranked highly because of uninterrupted connection between refuge and Thermalito Afterbay	9	270	Same as GRA-1	6	180	Considered least reliable due to reliance on water districts; water districts nominally interested	7	210	Rated slightly higher than GRA-14 due to eagerness of BWD to enter into an agreement; high interest from BWD
Water Quality	15	9	135	Highest water quality because water would be conveyed directly from Thermalito Afterbay and would be isolated from agricultural return flows	9	135	Same as GRA-1	8	120	Open system, but determined to be less susceptible to return flows	7	105	Water quality assumed to be good, but greatest potential for return flow interactior
Environmental Issues	20	5	100	Temporary impacts along the entire pipeline corridor	2	40	Same impact area as GRA-1, but majority of impacts would be permanent	8	160	Least impacts because of fewest improvements and riparian concerns	7	140	Ranked slightly lower than GRA-9 because of additional riparian impacts
Cost-Effectiveness	20	2	40	Most costly alternative by a wide margin, significant capital cost	4	80	Less than half the cost of GRA-1 but still includes significant capital cost	8	160	Least costly alternative, but not by a significant degree - fewest improvements	8	160	More costly than GRA-9, but rated the same
Implementation	10	3	30	Would require a number of easement agreements and permits	1	10	Most difficult implementation because of great deal of right-of-way that would have to be required	7	70	Continuation of on-going operations, even given past issues with BWGWD	7	70	BWD very interested in supplying water, b would still involve BWGWD; would require new agreement and operation method
Engineering Issues	5	9	45	Pipeline design considered straight-forward	7	35	Canal design would be more difficult	8	40	Fewest engineering constraints	7	35	Ranked same as GRA-3 because of assumed operation and maintenance issues
	100		620			570			730			720	

Impact Level — Range from 1 to 10, with 1 being most negative impact

The attached CEQA Environmental Checklist Form is the standard Initial Study checklist required in accordance with CEQA. This checklist is included for reference, and anticipated impacts from the proposed project and alternatives are identified. Explanations for all answers except "No Impact," which are required, are described in the Affected Environment and Environmental Consequences Section of this EA/IS and are not repeated here to eliminate redundancy

Environmental Checklist Form

1. **Project Title:** *Conveyance of Refuge Water Supply East Sacramento Valley Study Area*

2. **Lead Agency Name and Address:** *U.S. Bureau of Reclamation*
Ms. Mona Jefferies-Soniea
2800 Cottage Way
Sacramento, California 95825
(916) 979-2297

California Department of Fish and Game
Mr. Jerry Mensch
1416 Ninth Street
Sacramento, California 95814
(916) 653-0381

3. **Contact Person and Phone Number:** *(see above)*

4. **Project Location:** *East Sacramento Valley*

5. **Project Sponsor's Name and Address:**

U.S. Bureau of Reclamation
2800 Cottage Way
Sacramento, California 95825

California Department of Fish and Game
1416 Ninth Street
Sacramento, California 95814

6. **General Plan Designation:** *Various General Plan designations* 7. **Zoning:** *Primarily agriculture*

8. **Description of Project:** (Describe the whole action involved, including but not limited to later phases of the project, and any secondary, support, or off-site features necessary for its implementation. Attach additional sheets if necessary). *The U.S. Bureau of Reclamation in cooperation with U.S. Fish and Wildlife Service, and the California Department of Fish and Game propose to construct and/ or improve existing facilities to convey water supplies to the Sutter National Wildlife Reguse and Gray Lodge Wildlife Management Area within the East Sacramento Valley area of the Central Valley. These facilities would convey firm, average annual historical water deliveries in addition to an incremental amount of water supplies required for optimal wildlife management from CVP or State Water Project facilities to the*

boundary of each refuse as specified in Section 3406 (d)(5) of the Central Valley Project Improvement Act (CVPIA). See Project Description under Chapter I: Introduction and Statement of Purpose and Need.

9. **Surrounding Land Uses and Setting:** (Briefly describe the project's surroundings)

   The primary land use within the study area is agricultral, consisting of mainly orchard and field crops. Principal crops include rice, alfalfa hay, prunes, and walnuts. Rural residences, most of which are associated with agricultural holdings and operations, are located throughout the area. See Chapter II: Background.

10. **Other agencies whose approval is required** (e.g., permits, financing approval, or participation agreement.) *See Chapter VI: Consultation and Corrdination.*

Environmental Factors Potentially Affected:

The environmental factors checked below would be potentially affected by this project, involving at least one impact that is a "Potentially Significant Impact" or as indicated by the checklist on the following pages.

☒ Land Use and Planning	☐ Transportation/Circulation	☐ Public Services
☐ Population and Housing	☒ Biological Resources	☐ Utilities and Service Systems
☒ Geophysical	☐ Energy and Mineral Resources	☐ Aesthetics
☒ Water	☐ Hazards	☐ Cultural Resources
☐ Air Quality	☐ Noise	☐ Recreation
	☐ Mandatory Findings of Significance	

Determination:

(To be completed by the Lead Agency.)

On the basis of this initial evaluation:

I find that the proposed project COULD NOT have a significant effect on the environment, and a NEGATIVE DECLARATION will be prepared. ☐

I find that although the proposed project could have a significant effect on the environment, there will not be a significant effect in this case because the mitigation measures described on an attached sheet have been added to the project. A NEGATIVE DECLARATION will be prepared. ☒

I find that the proposed project MAY have a significant effect on the environment, and an ENVIRONMENTAL IMPACT REPORT is required. ☐

I find that the proposed project MAY have a significant effect(s) on the environment, but at lease one effect 1) has been adequately analyzed in an earlier document pursuant to applicable legal standards, and 2) has been addressed by mitigation measures based on the earlier analysis as described on attached sheets, if the effect is a "potentially significant impact" or "potentially significant unless mitigated." An ENVIRONMENTAL IMPACT REPORT is required, but it must analyze only the effects that remain to be addressed. ☐

I find that although the proposed project could have a significant effect on the environment, there WILL NOT be a significant effect in this case because all potentially significant effects (a) have been analyzed adequately in an earlier EIR pursuant to applicable standards and (b) have been avoided or mitigated pursuant to that earlier EIR, including revisions or mitigation measures that are imposed upon the proposed project.

Signature	Date
Printed Name	For

Evaluation of Environmental Impacts:

1) A brief explanation is required for all answers except "No Impact" answers that are adequately supported by the information sources a lead agency cities in the parentheses following each question. A "No Impact" answer is adequately supported if the referenced information sources show that the impact simply does not apply to projects like the one involved (e.g. the project falls outside a fault rupture zone). A "No Impact" answer should be explained where it is based on project-specific factors as well as general standards (e.g. the project will not expose sensitive receptors to pollutants, based on a project-specific screening analysis).

2) All answers must take account of the whole action involved, including off-site as well as on-site, cumulative as well as project-level, indirect as well as direct, and construction as well as operational impacts.

3) "Potentially Significant Impact" is appropriate if there is substantial evidence that an effect is significant. If there are one or more "Potentially Significant Impact" entries when the determination is made, an EIR is required.

4) "Negative Declaration: Potentially Significant Unless Mitigation Incorporated" applies where the incorporation of mitigation measures has reduced an effect from "Potentially Significant Impact" to a "Less than Significant Impact." The lead agency must describe the mitigation measures, and briefly explain how they reduce the effect to a less than significant level (mitigation measures from Section XVII, "Earlier Analyses," may be cross-referenced).

5) Earlier analyses may be used where, pursuant to the tiering, program EIR, or other CEQA process, an effect has been adequately analyzed in an earlier EIR or negative declaration. Section 15063(c)(3)(D). Earlier analyses are discussed in Section XVII at the end of the checklist.

6) Lead agencies are encouraged to incorporate into the checklist references to information sources for potential impacts (e.g. general plans, zoning ordinances). Reference to a previously prepared or outside document should, where appropriate, include a reference to the page or pages where the statement is substantiated. See the sample question below. A source list should be attached, and other sources used or individuals contacted should be cited in the discussion.

7) This is only a suggested form, and lead agencies are free to use different ones.

Sample Question:

Issues (and Supporting Information Sources):	Potentially Significant Impact	Negative Declaration: Potentially Significant Unless Mitigation Incorporated	Less Than Significant Impact	No Impact
Would the proposal result in potential impacts involving:				
Landslides or mudslides? (1,6)	☐	☐	☐	☒

(Attached source list explains that 1 is the general plan, and 6 is a USGS topo map. This answer would probably not need further explanation).

Issues (and Supporting Information Sources):	Potentially Significant Impact	Negative Declaration: Potentially Significant Unless Mitigation Incorporated	Less Than Significant Impact	No Impact
I. LAND USE AND PLANNING. Would the proposal:				
a) Conflict with general plan designation or zoning? (source #(s):)	☐	☐	☐	☒
b) Conflict with applicable environmental plans or policies adopted by agencies with jurisdiction over the project? ( )	☐	☐	☐	☒
c) Be incompatible with existing land use in the vicinity? ( )	☐	☐	☐	☒
d) Affect agricultural resources or operations (e.g. impacts to soils or farmlands, or impacts from incompatible land uses)? ( )	☐	☒	☐	☐
e) Disrupt or divide the physical arrangement of an established community (including a low-income or minority community? ( )	☐	☐	☐	☒
II. POPULATION AND HOUSING. Would the proposal:				
a) Cumulatively exceed official regional or local population projections? ( )	☐	☐	☐	☒
b) Induce substantial growth in an area either directly or indirectly (e.g. through projects in an undeveloped area or extension of major infrastructure)? ( )	☐	☐	☐	☒
c) Displace existing housing, especially affordable housing? ( )	☐	☐	☐	☒
III. GEOLOGIC PROBLEMS. Would the proposal result in or expose people to potential impacts involving:				
a) Fault rupture? ( )	☐	☐	☐	☒
b) Seismic ground shaking? ( )	☐	☐	☐	☒
c) Seismic ground failure, including liquefaction? ( )	☐	☐	☐	☒
d) Seiche, Tsunami, or volcanic hazard? ( )	☐	☐	☐	☒
e) Landslides or mudflows? ( )	☐	☐	☐	☒
f) Erosion, changes in topography or unstable soil conditions from excavation, grading, or fill? ( )	☐	☒	☐	☐
g) Subsidence of the land? ( )	☐	☐	☐	☒
h) Expansive soils? ( )	☐	☐	☐	☒

Issues (and Supporting Information Sources):	Potentially Significant Impact	Declaration: Potentially Significant Unless Mitigation Incorporated	Less Than Significant Impact	No Impact
i) Unique geologic or physical features?	☐	☐	☐	☒
IV. WATER. Would the proposal result in:				
a) Changes in absorption rates, drainage patterns, or the rate and amount of surface runoff? ( )	☐	☐	☒	☐
b) Exposure of people or property to water related hazards such as flooding? ( )	☐	☐	☐	☒
c) Discharge into surface waters or other alteration of surface water quality (e.g. temperature, dissolved oxygen or turbidity)? ( )	☐	☒	☐	☐
d) Changes in the amount of surface water in any water body? ( )	☐	☐	☒	☐
e) Changes in currents, or the course or direction of water movements? ( )	☐	☐	☒	☐
f) Change in the quantity of ground waters, either through direct additions or withdrawals, or through interception of an aquifer by cuts or excavations or through substantial loss of groundwater recharge capability? ( )	☐	☐	☒	☐
g) Altered direction or rate of flow of groundwater? ( )	☐	☐	☒	☐
h) Impacts to groundwater quality? ( )	☐	☐	☒	☐
i) Substantial reduction in the amount of groundwater otherwise available for public water supplies? ( )	☐	☐	☒	☐
V. AIR QUALITY. Would the proposal:				
a) Violate any air quality standard or contribute to an existing or projected air quality violation? ( )	☐	☒	☐	☐
b) Expose sensitive receptors to pollutants? ( )	☐	☐	☐	☒
c) Alter air movement, moisture, or temperature, or cause any change in climate? ( )	☐	☐	☐	☒
d) Create objectionable odors? ( )	☐	☐	☐	☒
VI. TRANSPORTATION/CIRCULATION. Would the proposal result in:				
a) Increased vehicle trips or traffic congestion? ( )	☐	☐	☐	☒
b) Hazards to safety from design features (e.g. sharp curves or dangerous intersections) or incompatible uses (e.g. farm	☐	☐	☐	☒

Issues (and Supporting Information Sources):	Potentially Significant Impact	Declaration: Potentially Significant Unless Mitigation Incorporated	Less Than Significant Impact	No Impact
equipment)? ( )				
c) Inadequate emergency access or access to nearby uses? ( )	☐	☐	☐	☒
d) Insufficient parking capacity on-site or off-site? ( )	☐	☐	☐	☒
e) Hazards or barriers for pedestrians or bicyclists? ( )	☐	☐	☐	☒
f) Conflicts with adopted policies supporting alternative transportation (e.g. bus turnouts, bicycle racks)? ( )	☐	☐	☐	☒
g) Rail, waterborne or air traffic impacts? ( )	☐	☐	☐	☒
VII. BIOLOGICAL RESOURCES. Would the proposal result in impacts to:				
a) Endangered, threatened or rare species or their habitats (including but not limited to plants, fish, insects, animals, and birds? ( )	☐	☒	☐	☐
b) Locally designated species (e.g. heritage trees)? ( )	☐	☐	☐	☒
c) Locally designated natural communities (e.g. oak forest, coastal habitat, etc.)? ( )	☐	☐	☒	☐
d) Wetland habitat (e.g. marsh, riparian and vernal pool)? ( )	☐	☐	☒	☐
e) Wildlife dispersal or migration corridors? ( )	☐	☐	☒	☐
VIII. ENERGY AND MINERAL RESOURCES. Would the proposal:				
a) Conflict with adopted energy conservation plans? ( )	☐	☐	☐	☒
b) Use non-renewable resources in a wasteful and inefficient manner? ( )	☐	☐	☐	☒
c) Result in the loss of availability of a known mineral resource that would be of future value to the region and the residents of the State? ( )	☐	☐	☐	☒
IX. HAZARDS. Would the proposal involve:				
a) A risk of accidental explosion or release of hazardous substances (including, but not limited to: oil, pesticides, chemicals or radiation)? ( )	☐	☐	☒	☐
b) Possible interference with an emergency response plan or emergency evacuation plan? ( )	☐	☐	☐	☒

Issues (and Supporting Information Sources):	Potentially Significant Impact	~~Negative~~ Declaration: Potentially Significant Unless Mitigation Incorporated	Less Than Significant Impact	No Impact
c) The creation of any health hazard or potential health hazards? ( )	☐	☐	☐	☒
d) Exposure of people to existing sources of potential health hazards?( )	☐	☐	☐	☒
e) Increased fire hazard in areas with flammable brush, grass, or trees?( )	☐	☐	☐	☒
X. NOISE. Would the proposal result in:				
a) Increases in existing noise levels? ( )	☐	☐	☒	☐
b) Exposure of people to severe noise levels? ( )	☐	☐	☐	☒
XI. PUBLIC SERVICES. Would the proposal have an effect upon, or result in a need for new or altered government services in any of the following areas				
a) Fire protection? ( )	☐	☐	☐	☒
b) Police protection? ( )	☐	☐	☐	☒
c) Schools? ( )	☐	☐	☐	☒
d) Maintenance of public facilities, including roads? ( )	☐	☐	☐	☒
e) Other governmental services? ( )	☐	☐	☐	☒
XII. UTILITIES AND SERVICE SYSTEM. Would the proposal result in a need for new systems or supplies, or substantial alterations to the following utilities:				
a) Power or natural gas? ( )	☐	☐	☐	☒
b) Communications systems? ( )	☐	☐	☐	☒
c) Local or regional water treatment or distribution facilities? ( )	☐	☐	☐	☒
d) Sewer or septic tanks? ( )	☐	☐	☐	☒
e) Storm water drainage? ( )	☐	☐	☒	☐
f) Solid waste disposal? ( )	☐	☐	☐	☒
g) Local or regional water supplies? ( )	☐	☐	☐	☒
XIII. AESTHETICS. Would the proposal:				

Issues (and Supporting Information Sources):	Potentially Significant Impact	Declaration: Potentially Significant Unless Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Affect a scenic vista or scenic highway? ( )	☐	☐	☐	☒
b) Have a demonstrable negative aesthetic effect? ( )	☐	☐	☐	☒
c) Create light or glare? ( )	☐	☐	☐	☒
XIV. CULTURAL RESOURCES. Would the proposal:				
a) Disturb paleontological resources? ( )	☐	☐	☐	☒
b) Disturb archaeological resources? ( )	☐	☐	☒	☐
c) Affect historical resources? ( )	☐	☐	☐	☒
d) Have the potential to cause a physical change which would affect unique ethnic cultural values?	☐	☐	☐	☒
e) Restrict existing religious or sacred uses within the potential impact area? ( )	☐	☐	☐	☒
XV. RECREATION. Would the proposal:				
a) Increase the demand for neighbor hood or regional parks or other recreational facilities? ( )	☐	☐	☐	☒
b) Affect existing recreational opportunities? ( )	☐	☐	☒	☐
XVI. MANDATORY FINDINGS OF SIGNIFICANCE.				
a) Does the project have the potential to degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, reduce the number or restrict the range of a rare or endangered plant or animal or eliminate important examples of the major periods of California history or prehistory?	☐	☐	☒	☐
b) Does the project have the potential to achieve short-term, to the disadvantage of long-term, environmental goals?	☐	☐	☐	☒
c) Does the project have impacts that are individually limited, but cumulatively considerable? ("Cumulatively considerable" means that the incremental effects of a project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects)	☐	☐	☒	☐

Issues (and Supporting Information Sources):	Potentially Significant Impact	~~Negative~~ Declaration: Potentially Significant Unless Mitigation Incorporated	Less Than Significant Impact	No Impact
d) Does the project have environmental effects which will cause substantial adverse effects on human beings, either directly or indirectly?	☐	☐	☐	☒

XVII. EARLIER ANALYSES.

Earlier analyses may be used where, pursuant to the tiering, program EIR, or other CEQA process, one or more effects have been adequately analyzed in an earlier EIR or negative declaration. Section 15063(C)(3)(D). In this case a discussion should identify the following on attached sheets:

a) **Earlier analyses used.** Identify earlier analyses and state where they are available for review.

b) **Impacts adequately addressed.** Identify which effects from the above checklist were within the scope of and adequately analyzed in an earlier document pursuant tot he applicable legal standards, and state whether such effects were addressed by mitigation measured based on the earlier analysis.

c) **Mitigation measures.** For effects that are "Negative Declarations: Less than Significant with Mitigation Incorporated," describe the mitigation measures which were incorporated or refined from the earlier document and the extent to which they address sit-specific conditions for the project.

Authority: Public Resources Code Sections 21083 and 21087.
Reference: Public Resources Code Sections 21080(c), 21080.1, 21080.3, 21082.1, 21083, 21083.3, 21093, 21094, 21151; *Sundstrom v. County of Mendocino*, 202 Cal. App. 3d 296 (1988); *Leonoff v. Monterey Board of Supervisors*, 222 Cal. App. 3d 1337 (1990)

Tehama-Colusa Canal Authority
P.O. BOX 1025 • 5513 HWY 162 • WILLOWS, CA 95988 • 916-934-2125 • FAX 916-934-2355

May 21, 1997

Mona Jefferies-Soneia
U. S. Bureau of Reclamation
Division of Planning
2800 Cottage Way
Sacramento, CA 95825

Re: DEA/IS for Conveyance of Refuge Water Supply, West Sacramento Study Area

Dear Ms. Jefferies-Soneia:

We have reviewed the Draft Environmental Assessment/Initial Study for the Conveyance of Refuge Water Supply Project West Sacramento Valley Study Area and have the following comment:

Chapter II : Existing Water Source

The Tehama-Colusa Canal is maintained in a state of "readiness to serve" on a year around basis and can supply water for conveyance to the Refuges during the winter months. The Canal is not dewatered for maintenance and cleaning. Water levels in portions of the Canal may be temporarily lowered, however, to accommodate and facilitate occasional repairs as needed during the low demand periods during the winter months.

Winter water delivery potential from the Tehama-Colusa Canal is severely limited during tne winter months because the gates are out at the Red Bluff Diversion Dam and any water entering the Canal must be pumped. Maximum winter pumping potential at Red Bluff is currently limited to less than 250 cfs. 1

I hope that this information will be of use and will improve the accuracy of your report. Should you have any questions or need additional information, please contact me.

Sincerely,

Arthur R. Bullock
General Manager

CC: Van Tenney, GCID

Response to Comment by Tehama-Colusa Canal Authority (May 21, 1997)

Comment 1:

Chapter 2 contains incorrect information regarding the Tehama-Colusa Canal.

Response to Comment 1:

The Finding of No Significant Impact and Negative Declaration, Chapter 2, has been modified to reflect the information provided by the TCCA. The understanding is that "winter water" is from September 15 though May 15.

SOUTH DELTA WATER AGENCY

2509 WEST MARCH LANE, SUITE 200
POST OFFICE BOX 70383
STOCKTON, CALIFORNIA 95267
TELEPHONE (209) 474-2509
FAX (209) 474-9701

May 28, 1997

Mona Jefferies-Soneia
U.S. Bureau of Reclamation
Division of Planning
2800 Cottage Way
Sacramento, CA 95825

Re: Comments to Conveyance of Refuge Water Supply Project
South San Joaquin Valley Study Area

Dear Ms. Jefferies-Soneia:

The South Delta Water Agency has reviewed the Draft Environmental Assessment/Initial Study for the Conveyance of Refuge Water Supply Project South San Joaquin Valley Study Area. Based on our review of this document and our recent telephone conversation with you, we understand that this document only examines the environmental impacts of the proposed conveyance facilities, and not the impacts of the water being supplied to the refuges. Those impacts of water delivered are to be examined in the CVPIA PEIS currently under development by the Bureau.

Consequently, the South Delta Water Agency makes no objections or comments to the subject document. The South Delta Water Agency's concerns in this matter deal with the impacts of the water uses, transfers, and management proposed for examination in the PEIS.

The South Delta Water Agency assumes that the Project cannot proceed past the study/development stage until the PEIS concludes that the transfer of water to the refuges has no significant environmental impacts or provides mitigation for any such impacts (per CEQA). 1

Please feel free to contact me if you have any questions.

Very truly yours,

BREWER, PATRIDGE & HERRICK
Attorneys At Law

By _____
JOHN HERRICK

JH/ce

cc: Mr. Alex Hildebrand

Response to Comment by South Delta Water Agency (May 28, 1997)

Comment 1:

The South Delta Water Agency assumes that the project cannot proceed past the study/development stage until the PEIS concludes that the transfer of water to the refuges has no significant environmental impacts or provides mitigation for any such impacts (per CEQA).

Response to Comment 1:

Reclamation has determined that the conveyance for the refuge water supply for the West Sacramento Study Area has independent utility from any additional or new water supplies being considered in the PEIS. Thus these conveyance facilities can proceed independent of the PEIS. Relative to some of the other study areas, for instance the South San Joaquin Study Area refuges (i.e. Kern and Pixley), the completion of the environmental compliance phase of the project is pending completion of the PEIS. This is because of the extent of the linkage of their conveyance facilities to water supplies beyond level 2. The transfer of water is not a part of the proposed action addressed by this environmental document, but will be reviewed in other documents to be prepared by Reclamation. It should be noted that the PEIS (as NEPA and the CVPIA require) will provide full disclosure of the benefits and impacts of implementing the CVPIA. Unlike Environmental Assessments and Findings of No Significant Impacts, implementation of mitigation is not a requirement of NEPA's EIS process. At the completion of the PEIS a Record of Decision (ROD) will be prepared that will provide notice of the final decision relative to the implementation of the CVPIA. This decision will be made cognizant of the commitments that may be part of the decisionmaking process.

As a point of clarification, the PEIS is the NEPA document for federal decision related to implementation of the CVPIA, and is independent of any CEQA documents that may be required for nonfederal decisions or actions. CEQA compliance with regard to the proposed action is focused on those actions which are under the purview of the state.

STATE OF CALIFORNIA-BUSINESS, TRANSPORTATION AND HOUSING AGENCY PETE WILSON, Governor

DEPARTMENT OF TRANSPORTATION
1352 West Olive Avenue
Post Office Box 12616
Fresno, California 93778

(209) 488-4153
TDD (209) 488-4066
FAX (209) 488-4088

6/9/97

June 2, 1997

2135-IGR/CEQA
6-TUL GEN
Draft Env Assessment--
Conveyance of Refuge Water
Supply-So San Joaquin
Valley Area
SCH# 97052046

Mr. Jerry Mensch
California Department of Fish and Game
1416 9th Street
Sacramento, CA 95814

Dear Mr. Mensch:

We have reviewed the draft Negative Declaration/Environmental Assessment for the above referenced project. The project proposes to construct and/or improve existing facilities to convey water supplies to Pixley and Kern National Wildlife Refuges within the South San Joaquin Valley. We have the following comments.

Our interest is primarily in the crossing of the State highways by canals, pipelines and other conveyances to the two wildlife refuges. An Encroachment Permit will be required for each crossing of the various State highways or perhaps one that will cover a mutiple number of crossings. Please contact Mr. Bob James of the Encroachment Permit Branch at (209) 488-4289 for futher information. 1

If you have any questions, or if you have a difference of opinion on our comments, please call me at (209) 488-4153.

Sincerely,

Randall D. Treece

RANDALL D. TREECE, AICP
Intergovernmental Coordinator
Office of System Planning

Response to Comment by California Department of Transportation (June 2, 1997)

Comment 1:

The proposed canals, pipelines, and other conveyance methods will cross State highways. An Encroachment Permit will be required for each of the various State highways.

Response to Comment 1:

The EA/IS identified all environmental permits and approvals that were required to implement the proposed project. Reclamation and CDFG will coordinate with Caltrans as necessary to obtain all required encroachment approvals.

PETE WILSON, Governor

Governor's Office of Planning and Research
1400 Tenth Street
Sacramento, CA 95814

June 10, 1997

JERRY MENSCH
DEPARTMENT OF FISH & GAME
1416 NINTH STREET
SACRAMENTO, CA 95814

Subject: CONVEYANCE OF REFUGE WATER SUPPLY-EAST SACRAMENTO VALLEY
SCH #: 97052044

Dear JERRY MENSCH:

The State Clearinghouse submitted the above named environmental document to selected state agencies for review. The review period is closed and none of the state agencies have comments. This letter acknowledges that you have complied with the State Clearinghouse review requirements for draft environmental documents, pursuant to the California Environmental Quality Act.

Please call Kristen Derscheid at (916) 445-0613 if you have any questions regarding the environmental review process. When contacting the Clearinghouse in this matter, please use the eight-digit State Clearinghouse number so that we may respond promptly.

Sincerely,

Antero A. Rivasplata

ANTERO A. RIVASPLATA
Chief, State Clearinghouse

Governor's Office of Planning and Research
(June 10, 1997)

This letter acknowledges that the project has complied with the State Clearinghouse review requirements for the draft environmental document, pursuant to the California Environmental Quality Act. This letter also signifies the end of the review period. No response required.

sacramento river preservation trust

June 27, 1997

Mona Jefferies-Soniea
U.S. Bureau of Reclamation
2800 Cottage Way
Sacramento, CA 95825

Jerry Mensch
California Department of Fish and Game
1416 Ninth Street
Sacramento, CA 95814

Dear Ms. Jefferies-Soniea and Mr. Mensch,

The Sacramento River Preservation Trust (Trust) has reviewed the Draft Environmental Assessment/Initial Study and Proposed Finding of No Significant Impact/Negative Declaration for the Conveyance of Refuge Water Supply Project, West Sacramento Valley Study Area and would like to make the following comments.

1) It appears that numerous pages are missing from the document. Please note that our copy has two page IV-29 and no page IV-30, two page IV-31 and no page IV-32, two page IV-33 and no page IV-34, two page IV-35 and no page IV-36, two page IV-37 and no page IV-38, two page IV-39 and no page IV-40, two page IV-41 and no page IV-42, two page IV-43 and no page IV-44;, two page IV-45 and no page IV-46, two page IV-47 and no page IV-48, two page IV-49 and no page IV-50, two page IV-51 and (possibly) no page IV-52. The same problem is encountered in Chapters V, VI, VII, VIII and IX, and in Appendix A. As such, the Trust copy is woefully incomplete. We can only assume that we are not the only folks who have encountered this problem. Therefore, we are hereby requesting a corrected copy along with an extended comment deadline of at least an additional 30 days. (Our apologies for not bringing this situation to your attention earlier, but the press of business has not allowed review of this document until the last several days.) 1

P.O. Box 5366, Chico, CA 95927
(916) 345-1865

2) The Summary of Project Impacts and Mitigation Measures table found in Chapter III-17 through III-22 and reiterated elsewhere in the document as the Environmental Commitment Checklist makes reference in a number of places (e.g., BR-4, BR-5, BR-6, BR-9, BR-10, BR-11, BR-20) to the word "should" when describing actions that are intended to occur. Please change all references to "should" to the word "shall." "Should" is a maybe; "shall" is an enforceable requirement. 2

3) Though the measures and checklist referenced in number 2 above are helpful, they do not meet the CEQA requirement of a clearly-defined mitigation and monitoring plan in that there is no description/delineation of **who** is required to make sure the mitigation requirements are met. Please provide such a plan. 3

4) The Trust finds it curious that there is no reference to potential impacts to anadromous fish in the document, in particular winter and spring-run chinook salmon and steelhead. Considering that both the Tehama-Colusa Canal Authority and Glenn-Colusa Irrigation District draw their water from both the Sacramento River and Stony Creek relative to this project, a description of both operations and their potential impacts to the species mentioned above is clearly called for. Please provide such information. 4

5) In analyzing each of the alternatives, the Trust was unable to find any reference to projected cost. On page III-2, cost-effectiveness is identified as one of six factors "best capturing the primary issues." Assuming this information is therefore available, please provide reference to its location and/or include in the alternatives discussion section. 5

Due to the number and nature of the issues raised by the Trust above, we are hereby requesting that the Draft Environmental Assessment/Initial Study for this project be redone and recirculated (if this turns out to be your future course of action, please disregard our request in number 1 above). As it currently stands, this document does not meet the requirements of the law at either the federal or the state level.

Thank you for giving us the opportunity to comment. We look forward to your timely response to our concerns.

Sincerely,

John B. Merz
Chair, Board of Directors

P.S. It has recently come to our attention that this project's implementation may be tied directly to the adoption of the Programmatic Environmental Impact Statement (PEIS) for the Central Valley Project Improvement Act (CVPIA). The Trust is a **strong** proponent of the installation of a siphon on Stony Creek and is concerned that any tie-in to the adoption of the PEIS could delay such a project for years. Unless you are aware of another way to accomplish this activity in a timely fashion, an indication of the accuracy of the above information would be appreciated. 6

P.P.S The Trust has not had the time to review the Draft Environmental Assessment/Initial Study (EA/IS) for the Conveyance of Refuge Water Supply Project, **East** Sacramento Valley Study Area (our emphasis). We can only assume that this document is more complete than the West Sacramento Valley Study Area document and are hereby requesting a copy of the Final EA/IS for that project once it is available.

cc: Van Tenney, Glenn-Colusa Irrigation District
Interested parties

Responses to Comments by Sacramento River Preservation Trust (May 28, 1997)

Comment 1:

The Draft Environmental Assessment/Initial Study and Proposed Finding of No significant Impact/Negative Declaration for the Conveyance of Refuge Water Supply Project, West Sacramento Valley Study Area is missing pages. A corrected copy was requested.

Response to Comment 1:

Reclamation and CDFG provided an additional copy for review and comment; no other reviewing entity raised concerns regarding missing pages.

Comment 2:

Change all references to the word "should" to the word "shall."

Response to Comment 2:

The word "should" was used because many of the mitigation measures will likely not be required based on the potential for minor refinements in the field. "Shall" will be used when identifying necessary mitigation in the mitigation monitoring plan to be prepared by CDFG.

Comment 3:

The document does not contain a mitigation monitoring plan.

Response to Comment 3:

A mitigation monitoring plan will be developed by CDFG in accordance with Public Resources Code 21081.6 (AB 3180) prior to signing the Negative Declaration.

Comment 4:

There is no reference to potential impacts to anadromous fish populations.

Response to Comment 4:

Impacts to anadromous and other fish species within the Sacramento River are not anticipated. No impacts are anticipated if GCID facilities are used because it is assumed that 1) all necessary diversions of water will continue to be in compliance with existing operational practices subject to the jurisdiction of the National Marine Fisheries Service (NMFS) and CDFG, and 2) progress will continue toward developing a long-term solution as required by the Joint Stipulation of Parties between the NMFS, CDFG, and GCID. Similarly, impacts associated with conveying water using the Tehama-Colusa Canal Authority (TCCA) system are assumed to be less than significant given NMFS and CDFG jurisdiction and progress being made on a long-term solution at the Red Bluff Diversion Dam.

Comment 5:

There was no mention of projected cost in the alternatives section.

Response to Comment 5:

Costs associated with each alternative are presented in Appendix A, Alternatives Screening Process - West Sacramento Valley Study Area.

Comment 6:

The projects implementation may be tied directly to the adoption of the Programmatic Environmental Impact Statement (PEIS) for the Central Valley Project Improvement Act (CVPIA). If the project is connected to the adoption of the PEIS the project could be delayed for years.

Response to Comment 6:

Title 34 of Public Law 102-575-- "The Central Valley Project Improvement Act"-- (CVPIA) specifically required delivery of firm Level 2 refuge water supplies, section 3406 (d)(1), to 15 refuges immediately upon enactment in 1992. Therefore, delivery of Level 2 water does not require completion of the Programmatic Environmental Impact Statement (PEIS) for the majority of the refuge areas identified in the CVPIA. However, during the course of planning long-term conveyance facilities, improvements or repairs to existing off-refuge conveyance facilities or new facilities were identified. These actions are proceeding independent of the PEIS. Off-refuge conveyance facilities will be sufficient to deliver Level 4 water if the additional capacity required is within standard design tolerances of the capacity required to deliver Level 2 water. If larger or new facilities are required for Level 4 (such as is the case for the Kern and Pixley National Wildlife Refuges) completion of the PEIS is required. In addition, long-term water acquisition of the refuge water supply increment above Level 2 will require completion of the PEIS.

ANDRA K. DUNN

DE CUIR & SOMACH
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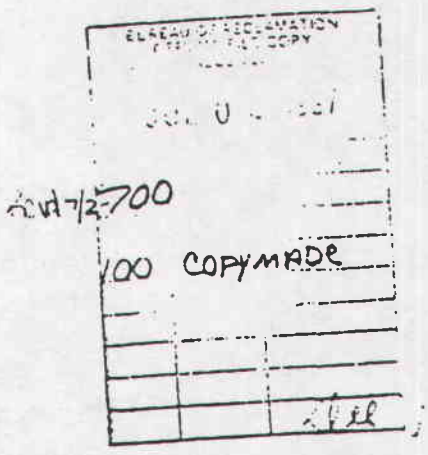

July 1, 1997

VIA FACSIMILE

Roger K. Patterson
Regional Director
Mid-Pacific Region
Bureau of Reclamation
2800 Cottage Way, MP-100
Sacramento, CA 95825

Dear Roger:

Last week at the public meeting on the Environmental Assessment (EA) for the "Conveyance of Refuge Water Supply Program (Refuge Conveyance Program)," representatives of the Bureau of Reclamation (Reclamation) inferred that actual implementation of the Program may be delayed while the Programmatic Environmental Impact Statement (PEIS) is being done on the Central Valley Project Improvement Act (CVPIA). The concern that seemed to be voiced was that the EA for the Refuge Conveyance Program must be tiered off of the PEIS. These statements, if they represent current Reclamation policy, are of great concern to Glenn-Colusa Irrigation District (District).

As you are aware, the District is very anxious to move forward with the Refuge Conveyance Program. We believe that the Refuge Conveyance Program is a win-win situation for both Reclamation and the District. It will allow for reliable delivery of water to the refuges, as well as allow for the elimination of the dam in Stony Creek. We see no reason, legal or otherwise, for delaying the Refuge Conveyance Program's immediate implementation.

The regulations issued by the Council on Environmental Quality only encourage agencies to avoid repetitive discussions of the same issues by tiering one environmental impact statement off of another. There is, however, no mandatory requirement that it be done. 40 C.F.R. § 1502.20. Guidance on the concept of tiering was provided in a 1983 memorandum to

Reclamation from the Director of the Office of Environmental Quality. In that memorandum, the Director specifically states that regulations do not require tiering; rather, they authorize its use when the agency determines that it is appropriate. Accordingly, it is not mandatory for the EA on the Refuge Conveyance Program to be tiered from the PEIS.

The real question, however, is not whether the EA on Refuge Conveyance Program should be tiered from the PEIS. The more appropriate consideration is whether the EA on the Refuge Conveyance Program has been properly scoped in the first instance. Much of the discussion at the public meeting centered on the acquisition of water for the refuges rather than on the Refuge Conveyance Program. Instead of taking the scoping question head-on, Reclamation only confuses the issue by attempting to rely on the PEIS. Whether or not the PEIS includes an analysis of the impacts associated with water acquisition, is irrelevant if the Water Acquisition Program is a "connected action" to the Refuge Conveyance Program. If the two actions are connected, then a single environmental document is required. 40 C.F.R. § 1508.25. The EA, followed by the PEIS or site-specific document on water acquisition will not meet the regulatory requirements.

The District does not believe that the Refuge Conveyance Program and the Water Acquisition Program are, however, "connected actions" that need to be analyzed in one environmental document. The CEQ Guidelines define "connected action" as those which:

i. Automatically trigger other actions which may require environmental impact statements.
ii. Cannot or will not proceed unless other actions are taken previously or simultaneously.
iii. Are interdependent parts of a larger action and depend on the larger action for their justification.

40 C.F.R. § 1508.25(a)(1).

As interpreted by the Ninth Circuit Court of Appeals, "connected actions" are those that are "inextricably intertwined." *Thomas v. Peterson*, 753 F.2d 754, 759 (9th Cir. 1985) An appropriate analogy used by the court in *Sylvester v. U.S. Army Corps of Engineers*, 884 F.2d 394, 400, is whether the actions are like separate links in the same bit of chain. Each link exists without the other, although each would benefit from the other links presence.

The Refuge Conveyance Program is a separate action that is properly analyzed on its own. The Program will correct deficiencies in the refuge conveyance systems that currently exist regardless of whether or not additional water supplies are subsequently acquired. Immediate implementation of the Refuge Conveyance Program will, therefore, enhance the reliability of even historic water supplies to the Refuges. The siphon under Stony Creek, by itself, has environmental benefits that warrants its construction.

Applying the CEQ Guidelines to the proposed actions demonstrates that the programs are not "connected actions." Implementing the Refuge Conveyance Program does not automatically trigger the acquisition of additional water supply. It can proceed without the Water Acquisition Program being subsequently implemented. Furthermore, the Refuge Conveyance Program can be justified on its own merits. It does not have to be linked to the Water Acquisition Program to be of use to the refuges. 1

While clearly the Refuge Conveyance Program and the Water Acquisition Programs together will make for a stronger wildlife refuge system, each are separate in the benefits and impacts associated with them. The District, therefore, urges Reclamation to continue to proceed immediately with Refuge Conveyance Program so that the benefits associated with that individual program can finally be enjoyed.

Very truly yours,

Sandra K. Dunn
Attorney

SKD/jlp

cc: Board of Directors
O.L. "Van" Tenney

Response to Comment by DeCuir & Somach (July 1, 1997)

Comment 1:

Implementing the Refuge Conveyance Program does not automatically trigger the acquisition of additional water supply. It can proceed without the Water Acquisition Program being subsequently implemented. The Refuge Conveyance Program can be justified on its own merits. It does not have to be linked to the Water Acquisition Program to be of use to the refuges.

Response to Comment 1:

Title 34 of Public Law 102-575 -- "The Central Valley Project Improvement Act"-- (CVPIA) specifically required delivery of firm Level 2 refuge water supplies, section 3406 (d)(1), to 15 refuges immediately upon enactment in 1992. Therefore, delivery of Level 2 water does not require completion of the Programmatic Environmental Impact Statement (PEIS) for the majority of the refuge areas identified in the CVPIA. However, during the course of planning long-term conveyance facilities, improvements or repairs to existing off-refuge conveyance facilities or new facilities were identified. These actions are proceeding independent of the PEIS. Off-refuge conveyance facilities will be sufficient to deliver Level 4 water if the additional capacity required is within standard design tolerances of the capacity required to deliver Level 2 water. If larger or new facilities are required for Level 4 (such as is the case for the Kern and Pixley National Wildlife Refuges), completion of the PEIS is required. In addition, long-term water acquisition of the refuge water supply increment above Level 2 will require completion of the PEIS.