Final

Fish and Wildlife Coordination Act Recommendations for the Shasta Lake Water Resources Investigation Appendix

Shasta Lake Water Resources Investigation, California

Prepared by:

U. S. Department of the Interior
Bureau of Reclamation
Mid-Pacific Region

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Contents

Tables

Abbreviations and Acronyms

ACID	Anderson-Cottonwood Irrigation District
af	acre feet
AFRP	Anadromous Fish Restoration Program
BLM	U.S. Department of the Interior, Bureau of Land Management
CALFED	CALFED Bay-Delta Program
CalPIF	California Partners in Flight
CAR	Coordination Act Report
CDFG	California Department of Fish and Game
CDFW	California Department of Fish and Wildlife
cfs	cubic feet per second
cm dbh	centimeter diameter at breast height
CVP	Central Valley Project
CVPIA	Central Valley Project Improvement Act
Delta	Sacramento-San Joaquin Delta
EIS	Environmental Impact Statement
ERP	Ecosystem Restoration Program
EWA	Environmental Water Account
FWCA	Fish and Wildlife Coordination Act
FCWAR	Fish and Wildlife Coordination Act Report
FERC	Federal Energy Regulatory Commission
FWCA	Fish and Wildlife Coordination Act

HEP	Habitat Evaluation Procedure
ISI	Integrated Storage Investigation
m	meter
MSCS	Multi-Species Conservation Strategy
NCCP	Natural Community Conservation Plan
NGO	nongovernmental organization
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NODOS	North-of-Delta Offstream Storage
OCAP	Operations Criteria and Plan
PCT	Project Coordination Team
PEIS/R	Programmatic Environmental Impact Statement/Environmental Impact Report
PG&E	Pacific Gas and Electric Company
RBDD	Red Bluff Diversion Dam
Reclamation	U.S. Department of the Interior, Bureau of Reclamation
RHJV	Riparian Habitat Joint Venture
RM	river mile
ROD	Record of Decision
SLWRI	Shasta Lake Water Resources Investigation
SRCAF	Sacramento River Conservation Area Forum
SWP	State Water Project
TAF	thousand acre-feet
TCD	temperature control device
USFS	U. S. Forest Service
USFWS	U.S. Fish and Wildlife Service
WMS	water management strategy
X2	salinity isopleth

Chapter 1
Summary

The U.S. Fish and Wildlife Service (USFWS) and the Department of the Interior, Bureau of Reclamation (Reclamation) have been consulting pursuant to the Fish and Wildlife Coordination Act (FWCA) since 2003. USFWS has provided numerous recommendations in response to interim reports and draft documents. Table 1 below contains Reclamation responses to the recommendations received from the USFWS during consultation. Reclamation has or will implement the recommendations as specified.

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Table 1. Responses to the Fish and Wildlife Coordination Act Recommendations for the Shasta Lake Water Resources Investigation

USFWS Recommendation	Reclamation Response
I. Guidelines for Definition of the No Action Alternative Reclamation should include in the No Action Alternative the following activities that are expected to take place, or should occur, with or without Shasta Lake expansion:	
A. New rules for OCAP.	**Accept**
B. Continued implementation of water use efficiency and conservation (e.g., increased irrigation efficiency in the ACID).	**Accept**
C. Joint Point of Diversion exchanges between the CVP/SWP.	**Accept**
D. Water transfers.	**Accept**
E. Water recycling.	**Accept**
F. Delta-Mendota Canal/California Aqueduct Intertie.	**Accept**
G. Banks Pumping Plant expansion.	**Not Accepted** Explanation: Expansion of Banks Pumping plant is not deemed to be a reasonably foreseeable action expected to occur. Accordingly, this project was not included in the No-Action Alternative.
H. Some of the high priority restoration actions identified by CVPIA and State Senate Bill 1086 for riparian restoration and increasing anadromous fish survival in the Sacramento River and tributaries (e.g., AFRP Restoration Plan (USFWS 2001) and SRCAF (SRCAF 2003)).	**Accept**
II. Anadromous Fish Survival without Raising Shasta Dam. Reclamation should evaluate the capability of increasing the survival of anadromous fish and water supply reliability without raising Shasta Dam. This could be accomplished through an additional alternative including the following: A. Modifying the existing TCD to improve temperature control. B. Improving spawning habitat by gravel augmentation in addition to required mitigation levels. C. Improving juvenile salmonid rearing habitat through large woody debris and riparian restoration (i.e. SRA cover) in the Keswick – RBDD reach, in the lower reaches of the nonnatal tributaries, and in the Sacramento River downstream from RBDD in addition to mitigation levels required by other programs (i.e., CALFED and CVPIA). D. Operational changes to Shasta Dam to increase cold water storage and/or increase minimum flows. E. Increasing water use efficiency (e.g., improve irrigation efficiency in the ACID canal). F. Considering conjunctive use of other existing and planned water storage facilities in the Central Valley.	**Accept in part** Explanation: As described in Chapter 2 of the Plan Formulation Appendix, each of these measures was evaluated in the plan formulation process. Since the Shasta Lake Water Resources Investigation (SLWRI) Environmental Impact Statement (EIS) tiers to the CALFED Programmatic Environmental Impact Statement/Environmental Impact Report (PEIS/R), it relies on the analysis and screening evaluations performed for the CALFED PEIS/R. While revisiting alternatives that were considered alongside CALFED's Preferred Program Alternative is not required, many of the management measures, including measures not related to the raising of Shasta Dam, were also evaluated during the SLWRI plan formulation process.

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Table 1. Responses to the Fish and Wildlife Coordination Act Recommendations for the Shasta Lake Water Resources Investigation (contd.)

USFWS Recommendation	Reclamation Response
III. Suggested Modifications to CP4 (in addition to mitigation identified and/or required by other programs (i.e., CALFED and CVPIA)). In the SLWRI alternatives as currently defined, the only measures remaining that address the primary objective of Anadromous Fish Survival are increasing the size of the cold water pool and modification of the TCD. Only in one alternative (CP4) does increasing the size of the cold water pool provide any significant benefits to anadromous fish survival. However, even in CP4, benefits to winter-, fall, and late fall-run Chinook salmon are limited to a few dry and critically dry water years representing only 9 percent of the October 1922 – September 2003 simulation period. The secondary objective Ecosystem Restoration has been dismissed from all alternatives except for "restoration around Shasta Lake" in CP5 that would likely be recommended for mitigation anyway. The Service recommends that the following be included in the CP4 alternative to better address the primary and secondary objectives of Anadromous Fish Survival and Ecosystem Restoration. Suggestions for modifying CP4 are below and include restoration goals from the SRCAF Handbook (SRCAF 2003), AFRP Final Restoration Plan (USFWS 2001), and the RHJV Bird Conservation Plan (RHJV 2004). Many of these recommendations were originally included in the SLWRI "Alternatives Considered but Removed from Further Analysis" (e.g., AFS-1, AFS-2, AFS-3). The Service recommends that Reclamation reconsider the resource management measures and alternatives that were removed from further analysis. Reclamation should consider the following recommendations for incorporation into CP4 in addition to mitigation that is already identified and/or required by other programs (e.g., CALFED and CVPIA):	
A. Restore the riparian corridor along mainstem Sacramento River and the lower reach of nonnatal tributaries (see SRCAF 2003, RHJV 2004, USFWS 2001) using the following actions: 1. Restore and protect a diversity of riparian successional states focusing on maintaining wide corridors with adjacent upland habitat along mainstem Sacramento River and lower reaches of nonnatal tributaries. 2. Prioritize restoration sites according to their proximity to existing high-quality sites (e.g., La Barranca site). 3. Leave the gates out year-round at RBDD and restore riparian habitat within the footprint of the existing reservoir from RBDD to 2 miles upstream as the Service also recommended in the FWCA report for the Red Bluff Fish Passage Improvement Project (USFWS 2008). 4. Restore juvenile salmonid rearing habitat along middle Sacramento River (between RBDD and Colusa). 5. Facilitate natural restoration of cottonwood and willow riparian habitat by allowing 3 - 5-year flood events during spring seed dispersal followed by a slow decline in river stage to insure successful germination; however, pulse flows should avoid artificially raising the stage 2 - 3 feet during the bank swallow nesting season (April – July). 6. Actively restore valley oak woodland and elderberry savanna riparian habitat focusing on establishing a wide continuous riparian corridor. 7. Control and eradicate non-native plant species (e.g., Arundo donax). Such control is best planned and implemented on a watershed scale. 8. Restore meanders and oxbows. 9. Set-back levees. 10. Relocate low man-made berms to higher ground. 11. Restore riparian areas along the lower reaches of smaller intermittent nonnatal tributaries (e.g., Churn Creek) that provide important rearing habitat for juvenile salmonids that emerged as fry within in the Sacramento River between Keswick Dam and RBDD. Intermittent tributaries are important rearing habitat for juvenile salmonids because the warmer temperatures and pulses of organic matter inputs accelerate the growth rate of juvenile salmonids (Maslin et al. 1996, 1997, 1998, 1999). 12. Protect physical processes where the natural hydrology is still intact through conservation easements or landowner participation (e.g., RM 270-272 near Bend; Red Bluff – Chico Landing Reach; and RM 144-176 of the Chico Landing – Colusa Reach; conservation easement and riparian restoration next to the La Barranca site along the Sacramento River). 13. Protect, enhance or recreate natural riparian processes, particularly hydrology and associated high water events, to promote the natural cycle of channel movement, sediment deposition, and scouring that create a diverse mosaic of riparian vegetation types. 14. As much as possible, manage flow to align with the near natural hydrograph (i.e., mimic natural flood events) sufficient to support scouring, deposition, and point bar formation. However, pulse flows should be time managed to avoid detrimental impacts on bank swallow nesting colonies and should not artificially raise levels more than 2-3 feet during the breeding season (April – July) (RHJV 2004). 15. Prioritize restoration sites according to surrounding land use. For example, suitable adjacent land uses include wilderness areas, unimproved parks/open space provided substantial invasive species issues do not exist, grazed oak woodlands, and timber production forests. To minimize the effects of predators and cowbird parasitism on breeding habitat for migratory birds, restoration sites should not be near intensive urban/suburban development, rural homes/ranchettes, manicured parks and golf course, dairies, intensive feedlots, and active livestock grazing (RHJV 2004). Brown-headed cowbirds may commute more than 12 kilometers between foraging grounds and the nest sites of their hosts (Mathews and Gougen 1997). 16. Work cooperatively with agricultural researchers to assess the potential of agriculture adjacent to existing riparian areas to be more "bird friendly." 17. Ensure that the patch size, configuration, and connectivity of restored riparian habitats adequately support the desired populations of riparian dependent species. 18. Restore and manage riparian forests to promote structural diversity and volume of the understory. 19. Limit restoration activities and disturbance events such as grazing, disking, herbicide application, and highwater events to the nonbreeding season. When such actions are absolutely necessary during the breeding season, time disturbance to minimize its impacts on nesting birds (RHJV 2004).	**Accept in part** Explanation: Following the release of the June 2008 CAR, Reclamation conducted a series of meetings/workshops with USFWS, NMFS, and CDFW to prioritize enhancement and mitigation efforts for the SLWRI. All of the FWCAR recommendations related to modifications to CP4 (Recommendation III) were considered and evaluated as part of this process. Three non-operational measures were prioritized for inclusion in CP4, (1) replenish spawning gravel in the Sacramento River, (2) construct instream aquatic habitat downstream from Keswick Dam, and (3) restore riparian and floodplain habitat along the Sacramento River. For the Final EIS, these three non-operational measures are included in CP4, CP4A, and CP5. Measures related to operations are included under the adaptive management plan for anadromous fish survival included under CP4 and CP4A. The adaptive management plan may include operational changes to the timing and magnitude of releases primarily to improve the quality and quantity of aquatic habitat. These changes may include increasing minimum flows, timing releases from Shasta Dam to mimic more natural seasonal flows, meeting flow targets for side channels, or retaining the additional 191,000 acre-feet (for CP4A) or 378,000 acre-feet (for CP4) of water in storage to meet temperature requirements. Reclamation would work cooperatively with the Sacramento River Temperature Task Group to determine the best use of the cold-water pool each year under an adaptive management plan.

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Table 1. Responses to the Fish and Wildlife Coordination Act Recommendations for the Shasta Lake Water Resources Investigation (contd.)

USFWS Recommendation	Reclamation Response
III. Suggested Modifications to CP4 (in addition to mitigation identified and/or required by other programs (i.e., CALFED and CVPIA)). (contd.)	
B. Using increased storage, increase minimum flows in the upper Sacramento River from the current 3,250 cfs to 4,000 cfs Oct 1 - Apr. 30, if end-of-September storage is 2.4 million af or greater (per the AFRP Final Restoration Plan).	**Accept in concept** Explanation: As described in EIS Chapter 2, this operational scenario was evaluated during the formulation of CP4 and CP4A. However, quantitative analyses indicated this operational scenario was not as effective as dedicating additional water from increased storage (378,000 acre-feet under CP4 and 191,000 acre-feet under CP4A) to increase the size of the cold-water pool for fishery benefit. However, an adaptive management plan was included under CP4 and CP4A. This adaptive management plan may include operational changes to the timing and magnitude of releases primarily to improve the quality and quantity of aquatic habitat. These changes may include increasing minimum flows, timing releases from Shasta Dam to mimic more natural seasonal flows, meeting flow targets for side channels, or retaining the additional 191,000 acre-feet (for CP4A) or 378,000 acre-feet (for CP4) of water in storage to meet temperature requirements.
C. Clarify whether and quantify the extent that the cold water pool (378,000 af) in CP4 would be used to augment flows to provide additional benefits for fish and wildlife species. Specify the authority for those augmented flows, and identify if those flows would be at the discretion of the Service, NOAA Fisheries, and CDFG.	**Accept**
D. Monitor and adaptively manage to guide restoration efforts. Conduct intensive, long-term monitoring (including bird monitoring) at selected sites. In order to analyze trends, long-term monitoring should continue for more than 5 years.	**Accept**
E. Augment gravel in the mainstem Sacramento River and lower reaches of tributaries (e.g., Cottonwood Creek).	**Accept in part** Explanation: Following the release of the June 2008 CAR, Reclamation conducted a series of meetings/workshops with USFWS, NMFS, and CDFW to prioritize enhancement and mitigation efforts for the Shasta Lake Water Resources Investigation. All of the CAR recommendations related to modifications to CP4 (Recommendation III) were considered and evaluated as part of this process. Three non-operational measures were prioritized for inclusion in CP4, (1) replenish spawning gravel in the Sacramento River, (2) construct instream aquatic habitat downstream from Keswick Dam, and (3) restore riparian and floodplain habitat along the Sacramento River.
F. Collaborate with the Anadromous Fish Screen Program to screen diversions and improve fish passage in mainstem Sacramento River and the lower reach of nonnatal tributaries (e.g., screen the diversion at California Lake along the mainstem Sacramento River downstream from the confluence with Cottonwood Creek). For example, improving fish passage at Millville on Clover Creek in the Cow Creek watershed would open up 13 miles of spawning habitat for fall-run Chinook salmon and potentially spring-run Chinook salmon and steelhead. Fish passage could also be improved with a fish ladder at the Bassett diversion on Old Cow Creek.	**Evaluated in coordination with USFWS, NMFS, and CDFW** Explanation: Following the release of the June 2008 CAR, Reclamation conducted a series of meetings/workshops with USFWS, NMFS, and CDFW to prioritize enhancement and mitigation efforts for the Shasta Lake Water Resources Investigation. All of the CAR recommendations related to modifications to CP4 (Recommendation III) were considered and evaluated as part of this process. Three non-operational measures were prioritized for inclusion in CP4, (1) replenish spawning gravel in the Sacramento River, (2) construct instream aquatic habitat downstream from Keswick Dam, and (3) restore riparian and floodplain habitat along the Sacramento River. For the Final EIS, these three non-operational measures are included in CP4, CP4A, and CP5. During this process, the screening of diversions and related fish passage actions were not prioritized for inclusion in alternatives, as Reclamation has other ongoing programs implementing these actions (e.g. CALFED ERP and CVPIA).
G. Collaborate with the Corps to identify and remove riprap along reaches of nonnatal tributaries and the mainstem of the Sacramento River supporting salmonid spawning and/or rearing habitat (USFWS 2004b).	**Evaluated in coordination with USFWS, NMFS, and CDFW** Explanation: Following the release of the June 2008 CAR, Reclamation conducted a series of meetings/workshops with USFWS, NMFS, and CDFW to prioritize enhancement and mitigation efforts for the Shasta Lake Water Resources Investigation. All of the CAR recommendations related to modifications to CP4 (Recommendation III) were considered and evaluated as part of this process. Three non-operational measures were prioritized for inclusion in CP4, (1) replenish spawning gravel in the Sacramento River, (2) construct instream aquatic habitat downstream from Keswick Dam, and (3) restore riparian and floodplain habitat along the Sacramento River. For the Final EIS, these three non-operational measures are included in CP4, CP4A, and CP5. During this process, no suitable sites were identified for riprap removal in the primary study area along the Sacramento River that would not conflict with flood control objectives.
H. Restore habitat at inactive gravel mines and cease instream gravel mining (e.g., Cottonwood Creek). Fill in the deep borrow pit in the Sacramento River at Turtle Bay created during the initial construction of Shasta Dam; this site continues to deplete spawning gravels downstream of Keswick Dam and hampers current gravel augmentation efforts.	**Evaluated in coordination with USFWS, NMFS, and CDFW** Explanation: Following the release of the June 2008 CAR, Reclamation conducted a series of meetings/workshops with USFWS, NMFS, and CDFW to prioritize enhancement and mitigation efforts for the Shasta Lake Water Resources Investigation. All of the CAR recommendations related to modifications to CP4 (Recommendation III) were considered and evaluated as part of this process. Three non-operational measures were prioritized for inclusion in CP4, (1) replenish spawning gravel in the Sacramento River, (2) construct instream aquatic habitat downstream from Keswick Dam, and (3) restore riparian and floodplain habitat along the Sacramento River. For the Final EIS, these three non-operational measures are included in CP4, CP4A, and CP5.

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USFWS Recommendation	Reclamation Response
III. Suggested Modifications to CP4 (in addition to mitigation identified and/or required by other programs (i.e., CALFED and CVPIA)). (contd.)	
I. Increase water use efficiency to a specified level (e.g., irrigation efficiency in the ACID).	**Accept in concept** Explanation: All action alternatives would include a water conservation program for increased water deliveries that would be created by the project to augment current water use efficiency practices. The proposed program would consist of a 10-year initial program to which Reclamation would fund water conservation efforts. Reclamation would then implement an investment strategy, in coordination with project beneficiaries, to identify and prioritize projects which, in conjunction with other water conservation activities, would cost-effectively reduce water demand and increase water conservation. This process would result in developing, evaluating, and prioritizing projects for funding. The program could be established as an extension of existing Reclamation programs, or as a new program through teaming with cost-sharing partners. Combinations and types of water use efficiency actions funded would be tailored to meet the needs of identified cost-sharing partners, including consideration of cost effectiveness at a regional scale for agencies receiving funding.
J. Ensure that Delta inflows for the Sacramento River and Yolo Bypass align with targets established in appropriate ongoing planning efforts and as provided in existing biological opinions.	**Accept**
IV. Potential Mitigation The Service has tentatively identified the following measures as possible means for mitigation for SLWRI-associated impacts. Many of the following recommendations were also made by the Service in the May 2007 Planning Aid Memorandum for the SLWRI (USFWS 2007a).	
A. Leave trees/shrubs in the Shasta Lake Inundation Zone for fish/wildlife habitat use (USFWS 2007a) and for western purple martin nesting habitat.	**Accept**
B. Conduct genetic analyses of Shasta huckleberry populations to determine if they are genetically distinct from the coastal red huckleberry populations. Protect other populations of Shasta huckleberry from disturbance through conservation easements or other means.	**Accept**
C. Conduct genetic analyses of the Shasta snow-wreath populations to determine what genetic diversity would be lost.	**Accept**
D. Survey for Shasta snow-wreath to determine the northern extent of its range and thus what percent of the total population and potential habitat would be affected by the SLWRI.	**Accept**
E. Transplant Shasta snow-wreath populations within the Inundation Zone to suitable protected habitat and monitor. Analyze the ability of Shasta snow-wreath to propagate upslope beyond the Inundation Zone. Remove invasive species (e.g., Himalayan blackberry) that hinder the ability of Shasta snow-wreath to colonize new areas.	**Accept in concept** Explanation: The Final EIS contains a mitigation measure that includes these recommendations. The Preliminary Environmental Commitments and Mitigation Plan Appendix of the Final EIS also describes the commitment Reclamation has made to implement a comprehensive mitigation and monitoring plan. The USFWS participated in the development of the language used by Reclamation for this mitigation measure. The mitigation plan also includes a commitment to purchase lands or conservation easements intended to meet multiple objectives including conservation, protection, preservation and restoration.
F. Protect other Shasta snow-wreath populations from disturbance in perpetuity through conservation easements or other means (e.g., McCloud River arm between the bridge and the upstream reservoir).	**Accept in concept** Explanation: See response to Recommendation IV-E above.
G. Protect Cantelow's lewisia populations from disturbance in perpetuity through conservation easements.	**Accept in concept** Explanation: See response to Recommendation IV-E above.
H. Protect Shasta sideband and Wintu sideband snails limestone outcrop habitats along the McCloud River and Pit River arms, respectively.	**Accept in concept** Explanation: See response to Recommendation IV-E above. Private lands potentially available for purchase or conservation easements with Shasta sideband snail populations have been identified.
I. Protect Shasta chaparral snail and Shasta hesperian snail habitat from disturbance in perpetuity through conservation easements or other means.	**Accept in concept** Explanation: See response to Recommendation IV-E above. Private lands potentially available for purchase or conservation easements with Shasta chaparral and Shasta hesperian snail populations have been identified.
J. Protect Shasta salamander habitat from disturbance in perpetuity through conservation easements or other means.	**Accept in concept** Explanation: See response to Recommendation IV-E above. Private lands potentially available for purchase or conservation easements with Shasta salamander populations have been identified. Additionally, Reclamation supported studies that resulted in a significant increase of the known species range.
K. Collaborate with PG&E to manage flows in Shasta Lake tributaries for tributary stream habitat and flow enhancement (USFWS 2007a)	**Implemented through separate regulatory process** Explanation: The FERC relicensing process for the PG&E McCloud-Pit Project is ongoing. Based on the PG&E's license application and related Final EIS, flows are expected to be increased in the lower McCloud River as a result of this process.

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Table 1. Responses to the Fish and Wildlife Coordination Act Recommendations for the Shasta Lake Water Resources Investigation (contd.)

USFWS Recommendation	Reclamation Response
IV. Potential Mitigation (contd.)	
L. Remediate and restore mining sites and forest areas around and near Shasta Lake (e.g., treat soils to reduce acidity, plant vegetation, clean up creeks, and eliminate acid mine drainage, etc.) (USFWS 2007a); however, remediation activities should not disturb Shasta huckleberry shrubs which are adapted to the low pH soils.	**Accept in concept** Explanation: The Final EIS contains a mitigation measure that includes these recommendations. The Preliminary Environmental Commitments and Mitigation Plan Appendix of the Final EIS also describes the commitment Reclamation has made to implement a comprehensive mitigation and monitoring plan. The USFWS participated in the development of the language used by Reclamation for this mitigation measure. The mitigation plan also includes a commitment to purchase lands or conservation easements intended to meet multiple objectives including conservation, protection, preservation and restoration. Locations on both federal and adjoining private lands have been identified and site-specific mitigation planning process is ongoing to identify options available for these sites.
M. Restore Sacramento River riparian corridor habitat (e.g., riparian, wetland, and other habitats, possibly at Sacramento River Conservation Area, and other sites). (USFWS 2007a).	**Accept**
N. Emphasize listed species recovery with project mitigation (consistent with CALFED ERP goals) (USFWS 2007a).	**Accept**
O. Implement a coarse sediment addition project that would sustain gravel and sand loads in the Sacramento River by adding sand and spawning-sized gravel on a regular basis and at a much larger scale to better mimic natural sediment loads and therefore provide the sediment from which the river would naturally create and maintain spawning riffles (USFWS 2007a).	**Accept in concept** Explanation: Although action alternatives are not anticipated to adversely affect spawning gravel loads in the Sacramento River, gravel augmentation is included as an enhancement measure under CP4, CP4A, and CP5.
P. Resolve the fish passage problems at the Red Bluff Diversion Dam so fish can take advantage of improvements downstream of the Shasta Dam and in Battle Creek, which is slated for instream habitat restoration (USFWS 2007a).	**Implemented through separate program** Explanation: The Red Bluff Diversion Dam Fish Passage Improvement Project has been completed by Reclamation and is included in the existing conditions and No-Action Alternative.
Q. Protect suitable limestone, mixed conifer, and conifer/woodland habitat for special-status bat species near Shasta Lake (i.e., western red bat, spotted bat, Townsend' big-eared bat, pallid bat, greater western mastiff bat, small-footed myotis, long-eared myotis, fringed myotis, long-legged myotis, and Yuma myotis).	
1. Use acoustic technology to identify bat species within the Inundation Zone that would be affected by the SLWRI.	**Not accepted** Explanation: This recommendation was not accepted based on further discussions with USFWS, USFS, BLM and CDFW biologists as the biological studies were implemented prior to completing the DEIS. This was based on the presumption that these species did occur throughout the project area and it was not necessary to utilize this technology. Reclamation worked closely with Cooperating Agencies, including USFWS and Forest Service, to characterize potentially occurring special-status bat species in the planning area. For the purpose of impact analysis, the DEIS assumed presence of these bat species and the Final EIS included specific mitigation measures developed in conjunction with USFWS staff for these impacts. A thorough inventory of all known caves in the immediate vicinity of Shasta Lake was conducted to identify potential habitat and/or presence of Townsend' big-ear bats. Those results and impact statements are included in the Final EIS.
2. Collaborate with the California Bat Conservation Fund.	**Accept in concept** Explanation: Although Reclamation's planning team consulted with bat species experts in federal agencies and academic institutions, there was no formal collaboration with the California Bat Conservation Fund. At this point in the planning process, without project authorization, it would be premature to enter into a relationship with conservation organizations. This will be accepted in concept at some future date
3. Create and/or enhance bat habitat by constructing bat boxes and modifying entrances to abandoned mine shafts in the lake area (e.g., install bat gates to allow bat passage but block human access) (USFWS 2007a).	**Accept in concept** Explanation: The comprehensive mitigation plan summarized in the Preliminary Environmental Commitments and Mitigation Plan Appendix of the Final EIS includes a number of mitigation measures that could be selected to create or enhance habitat for special-status bat species. Ongoing consultation with the Forest Service and BLM indicate that these agencies have an ongoing program to gate caves and mine adits on lands adjacent to Shasta Lake. Reclamation has committed to support these types of actions as opportunities are identified.
4. Restrict the use of pesticides in bat foraging areas.	**Not applicable** Explanation: The project description provided in Chapter 2 of the Final EIS does not identify any need or requirement to use pesticides.

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Table 1. Responses to the Fish and Wildlife Coordination Act Recommendations for the Shasta Lake Water Resources Investigation (contd.)

USFWS Recommendation	Reclamation Response
IV. Potential Mitigation (contd.)	
R. Select oak woodland mitigation sites for protection based on the following criteria (CalPIF 2002a): 1. Sites with intact oak regeneration and decay processes. 2. Current indicators of avian population health. 3. Diverse age structure of oak trees, particularly large old oak trees. 4. Diverse range of oak woodland habitat types. 5. Suitable surrounding land use. For example, oak woodlands that are adjacent to pastures or residential developments may be more accessible to European starlings, which compete for nest cavities with other secondary cavity nesters (Verner *et al.* 1997, Merenlender *et al.* 1998). Urban or suburban development may also have a negative effect on the presence or abundance of some bird species, including lark sparrow and rufous-crowned sparrow, in adjacent oak woodlands (Stralberg and Williams 2002). 6. Adjacent to intact chaparral, grassland, pine, and/or riparian habitats. 7. Conservation threats and opportunities for protection. 8. Proximity to existing high quality sites. 9. Protect a diverse mosaic of oak woodland habitat as recommended in the "Conservation Measures and Habitat Protection for Focal Bird Species" section below.	**Accept in concept** Explanation: The Final EIS, including the Preliminary Environmental Commitments and Mitigation Plan Appendix, includes a discussion of mitigation measures developed in conjunction with USFWS that focus on acquisition of lands that would meet various mitigation objectives for a wide array of biological resources. A number of mitigation measures agreed to by the USFWS in a series of meetings ending in February 2014 emphasizes the value of oak woodlands and other habitat types that offer unique and high quality habitat that would be acquired or otherwise be protected and/or restored. Private lands potentially available for purchase or conservation easements that include diverse oak habitats have been identified.
S. Select coniferous forest mitigation sites for protection based on the following criteria:	
1. Protect limestone outcrops supporting special-status species such as Shasta salamander, Shasta sideband, Wintu sideband snail, and Shasta snow-wreath.	**Accept in concept** Explanation: The Final EIS, including the Preliminary Environmental Commitments and Mitigation Plan Appendix, includes a discussion of mitigation measures developed in conjunction with USFWS that focus on acquisition of lands that would meet various mitigation objectives for a wide array of biological resources. A number of mitigation measures agreed to by the USFWS in a series of meetings ending in February 2014 emphasizes the value of coniferous forest and other habitat types that offer unique and high quality habitat that would be acquired or otherwise protected and/or restored. Private lands potentially available for purchase or conservation easements that include limestone habitats supporting Shasta salamander, Shasta sideband, and other endemics such as Shasta limestone monkeyflower and Shasta fawn lily have been identified.
2. Protect habitat supporting special-status species such as Pacific fisher, northern spotted owl, sharp-skinned hawk, Cooper's hawk, northern goshawk, peregrine falcon, flammulated owl, long-eared owl, black swift, Vaux's swift, Lewis's woodpecker, red-breasted sapsucker, olive-sided flycatcher, western purple martin, special-status bat species (listed above), and ringtail.	**Accept in concept** Explanation: The Final EIS, including the Preliminary Environmental Commitments and Mitigation Plan Appendix, includes a discussion of mitigation measures developed in conjunction with USFWS that focus on acquisition of lands that would meet various mitigation objectives for a wide array of biological resources. A number of mitigation measures agreed to by the USFWS in a series of meetings ending in February 2014 emphasizes the value of coniferous forest and other habitat types that offer unique and high quality habitat that would be acquired or otherwise protected and/or restored. Private lands potentially available for purchase or conservation easements that include conifer forests and several special-status species have been identified.
3. Protect existing old-growth/late-successional coniferous forest habitats.	**Accept in concept** Explanation: The Final EIS, including the Preliminary Environmental Commitments and Mitigation Plan AppendixAppendix, includes a discussion of mitigation measures developed in conjunction with USFWS that focus on acquisition of lands that would meet various mitigation objectives for a wide array of biological resources. A number of mitigation measures agreed to by the USFWS in a series of meetings ending in February 2014 emphasizes the value of coniferous forest and other habitat types that offer unique and high quality habitat that would be acquired or otherwise protected and/or restored. Private lands potentially available for purchase or conservation easements that include conifer forests with late-seral characteristics and several special-status species have been identified.
4. Protect habitat with current indicators of avian population health.	**Accept in concept** Explanation: The Final EIS, including the Preliminary Environmental Commitments and Mitigation Plan Appendix, includes a discussion of mitigation measures developed in conjunction with USFWS that focus on acquisition of lands that would meet various mitigation objectives for a wide array of biological resources. A number of mitigation measures agreed to by the USFWS in a series of meetings ending in February 2014 emphasizes the value of coniferous forest and other habitat types that offer unique and high quality habitat that would be acquired or otherwise protected and/or restored. Private lands potentially available for purchase or conservation easements that include various conifer forests and several special-status species have been identified.

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Table 1. Responses to the Fish and Wildlife Coordination Act Recommendations for the Shasta Lake Water Resources Investigation (contd.)

USFWS Recommendation	Reclamation Response
IV. Potential Mitigation (contd.)	
S. Select coniferous forest mitigation sites for protection based on the following criteria: (contd.)	
5. Ensure that patch size, configuration, and connectivity of coniferous habitats adequately support the desired populations of coniferous forest associated species.	**Accept in concept** Explanation: The Final EIS, including the Preliminary Environmental Commitments and Mitigation Plan Appendix, includes a discussion of mitigation measures developed in conjunction with USFWS that focus on acquisition of lands that would meet various mitigation objectives for a wide array of biological resources. A number of mitigation measures agreed to by the USFWS in a series of meetings ending in February 2014 emphasizes the value of coniferous forest and other habitat types that offer unique and high quality habitat that would be acquired or otherwise protected and/or restored. Private lands potentially available for purchase or conservation easements that include various conifer forests and several special-status species have been identified.
6. Select sites near existing high quality sites.	**Accept in concept** Explanation: The Final EIS, including the Preliminary Environmental Commitments and Mitigation Plan Appendix, includes a discussion of mitigation measures developed in conjunction with USFWS that focus on acquisition of lands that would meet various mitigation objectives for a wide array of biological resources. A number of mitigation measures agreed to by the USFWS in a series of meetings ending in February 2014 emphasizes the value of coniferous forest and other habitat types that offer unique and high quality habitat that would be acquired or otherwise protected and/or restored.
7. Select sites with intact adjacent habitats.	**Accept in concept** Explanation: The Final EIS, including the Preliminary Environmental Commitments and Mitigation Plan Appendix, includes a discussion of mitigation measures developed in conjunction with USFWS that focus on acquisition of lands that would meet various mitigation objectives for a wide array of biological resources. A number of mitigation measures agreed to by the USFWS in a series of meetings ending in February 2014 emphasizes the value of coniferous forest and other habitat types that offer unique and high quality habitat that would be acquired or otherwise protected and/or restored. Private lands potentially available for purchase or conservation easements that include various conifer forests and several special-status species have been identified.
8. Select sites with suitable surrounding land use. Surrounding land uses may influence the population sizes of brown-headed cowbirds and predators such as domestic cats, jays, skunks, raccoons, ravens, and crows.	
a. Beneficial adjacent land uses include wilderness and unimproved parks/open space (provided substantial nonnative species problems do not exist) with suitable management.	**Accept in concept** Explanation: The Final EIS, including the Preliminary Environmental Commitments and Mitigation Plan Appendix, includes a discussion of mitigation measures developed in conjunction with USFWS that focus on acquisition of lands that would meet various mitigation objectives for a wide array of biological resources. A number of mitigation measures agreed to by the USFWS in a series of meetings ending in February 2014 emphasizes the value of coniferous forest and other habitat types that offer unique and high quality habitat that would be acquired or otherwise protected and/or restored. Private lands potentially available for purchase or conservation easements that include various conifer forests in different ecological settings have been identified.
b. Detrimental adjacent land uses include manicured parks and golf courses, rural homes/ranchettes permanent and intensive feedlots, and intensive urban/suburban developments.	**Not applicable** Explanation: This specific criteria is not directly applicable to the SLWRI project due to the overall rural and mountainous character of the landscape surrounding Shasta Lake. More than 300 miles of the shoreline surrounding Shasta Lake is managed by the Forest Service and BLM.
9. High tree species diversity.	**Accept in concept** Explanation: The Final EIS, including the Preliminary Environmental Commitments and Mitigation Plan Appendix, includes a discussion of mitigation measures developed in conjunction with USFWS that focus on acquisition of lands that would meet various mitigation objectives for a wide array of biological resources. A number of mitigation measures agreed to by the USFWS in a series of meetings ending in February 2014 emphasizes the value of coniferous forest and other habitat types that offer unique and high quality habitat that would be acquired or otherwise protected and/or restored. Private lands have been identified that are potentially available for purchase or conservation that include diverse conifer forests have been identified.
10. Large trees and large snags.	**Accept in concept** Explanation: The Final EIS, including the Preliminary Environmental Commitments and Mitigation Plan Appendix, includes a discussion of mitigation measures developed in conjunction with USFWS that focus on acquisition of lands that would meet various mitigation objectives for a wide array of biological resources. A number of mitigation measures agreed to by the USFWS in a series of meetings ending in February 2014 emphasizes the value of coniferous forest and other habitat types that offer unique and high quality habitat that would be acquired or otherwise protected and/or restored. Private lands have been identified that are potentially available for purchase or conservation that include diverse conifer forests have been identified.

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Table 1. Responses to the Fish and Wildlife Coordination Act Recommendations for the Shasta Lake Water Resources Investigation (contd.)

USFWS Recommendation	Reclamation Response
IV. Potential Mitigation (contd.)	
S. Select coniferous forest mitigation sites for protection based on the following criteria: (contd.)	
11. Diverse shrub understory and forest floor complexity (e.g., downed logs, root wads and a deep litter layer).	**Accept in concept** Explanation: The Final EIS, including the Preliminary Environmental Commitments and Mitigation Plan Appendix, includes a discussion of mitigation measures developed in conjunction with USFWS that focus on acquisition of lands that would meet various mitigation objectives for a wide array of biological resources. A number of mitigation measures agreed to by the USFWS in a series of meetings ending in February 2014 emphasizes the value of coniferous forest and other habitat types that offer unique and high quality habitat that would be acquired or otherwise protected and/or restored. Private lands have been identified that are potentially available for purchase or conservation that include diverse conifer forests have been identified.
12. Protect a diverse mosaic of coniferous forest habitat as recommended in the "Conservation Measures and Habitat Protection for Focal Bird Species" section below.	**Accept in concept** Explanation: The Final EIS, including the Preliminary Environmental Commitments and Mitigation Plan Appendix, includes a discussion of mitigation measures developed in conjunction with USFWS that focus on acquisition of lands that would meet various mitigation objectives for a wide array of biological resources. A number of mitigation measures agreed to by the USFWS in a series of meetings ending in February 2014 emphasizes the value of coniferous forest and other habitat types that offer unique and high quality habitat that would be acquired or otherwise protected and/or restored. Private lands have been identified that are potentially available for purchase or conservation that include diverse conifer forests have been identified.
T. Select mixed chaparral mitigation sites for protection based on the following criteria (RHJV 2004): 1. Current indicators of avian population health. 2. Proximity to existing high quality sites. 3. Suitable surrounding land use. Surrounding land uses may influence the population sizes of brown-headed cowbirds and predators such as domestic cats, jays, skunks, raccoons, ravens, and crows. 4. Ensure that the patch size, configuration, and connectivity of restored scrub habitats adequately support the desired populations of scrub-dependent species. 5. Restore natural fire regimes in areas that still have potential to function within historic range of variability. 6. Protect a diverse mosaic of mixed chaparral habitat as recommended in the "Conservation Measures and Habitat Protection for Focal Bird Species" section below.	**Accept in concept** Explanation: The Final EIS, including the Preliminary Environmental Commitments and Mitigation Plan Appendix, includes a discussion of mitigation measures developed in conjunction with USFWS that focus on acquisition of lands that would meet various mitigation objectives for a wide array of biological resources. A number of mitigation measures agreed to by the USFWS in a series of meetings ending in February 2014 emphasizes the value of mixed chaparral and other habitat types that offer unique and high quality habitat that would be acquired or otherwise protected and/or restored. Private lands potentially available for purchase or conservation easements that include diverse chaparral habitats have been identified.
U. Select montane riparian mitigation sites for protection based on the following criteria (RHJV 2004): 1. Protect habitat supporting special-status species such as Shasta snow-wreath, western purple martin, foothill yellow-legged frog, tailed frog, northwestern pond turtle, osprey, bald eagle, willow flycatcher, bank swallow, yellow warbler, yellow-breasted chat, Shasta hesperian snail, pebblesnails and other aquatic mollusks. 2. See the "Suggested Modifications to CP4" section above for recommendations for restoring riparian habitat, maintaining wide corridors, and preserving areas with natural hydrologic processes intact. 3. Protect a diverse mosaic of montane riparian habitat as recommended in the "Conservation Measures and Habitat Protection for Focal Bird Species" section below.	**Accept in concept** Explanation: The Final EIS, including the Preliminary Environmental Commitments and Mitigation Plan Appendix, includes a discussion of mitigation measures developed in conjunction with USFWS that focus on acquisition of lands that would meet various mitigation objectives for a wide array of biological resources. A number of mitigation measures agreed to by the USFWS in a series of meetings ending in February 2014 emphasizes the value of montane riparian and other habitat types that offer unique and high quality habitat that would be acquired or otherwise protected and/or restored. Private lands potentially available for purchase or conservation easements that include diverse foothill/montane riparian habitats, and several special-status species, have been identified.
V. Identify mitigation sites and strategies early in the planning process for final analysis and incorporation within the HEP application.	**Accept in concept** Explanation: The USFWS worked closely with Reclamation, the Forest Service and other resource agencies to conduct a HEP analysis that was used to characterize the biological resources and analyze impacts. Through extensive dialogue as a member of Reclamation's PCT, the USFWS and other agencies agreed that the type and magnitude of mitigation required for SLWRI impacts on biological resources was not conducive to applying HEP with respect to mitigation. The USFWS participation in Reclamation's 2013/2014 mitigation planning process is documented in the Preliminary Environmental Commitments and Mitigation Plan Appendix of the Final EIS and is reflected in a wide array of mitigation measures. However, all agencies agreed that the 2013/2014 approach to defining mitigation was an acceptable alternative to the traditional HEP mitigation process.

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Table 1. Responses to the Fish and Wildlife Coordination Act Recommendations for the Shasta Lake Water Resources Investigation (contd.)

USFWS Recommendation	Reclamation Response
V. Conservation Measures and Habitat Protection for CalPIF Focal Bird Species The Service recommends that Reclamation incorporate the following conservation measures and habitat protection priorities identified for focal bird species in the CalPIF and RHJV Bird Conservation Plans (CalPIF 2000, 2002a, 2002b, 2004, RHJV 2004) as mitigation for habitat loss around Shasta Lake.	
A. Ponderosa Pine and Mixed Coniferous Forest	
1. For flammulated owl, preserve snags and ensure snag recruitment in ponderosa pine forests and explore the use of nest boxes.	**Accept in concept** Explanation: The Final EIS, including the Preliminary Environmental Commitments and Mitigation Plan Appendix, includes a discussion of mitigation measures developed in conjunction with USFWS that focus on acquisition of lands that would meet various mitigation objectives for a wide array of biological resources. A number of mitigation measures agreed to by the USFWS in a series of meetings ending in February 2014 emphasizes the value of Ponderosa pine and Mixed coniferous forest and other habitat types that offer unique and high quality habitat that would be acquired or otherwise protected and/or restored. Private lands potentially available for purchase or conservation easements that include diverse conifer habitats and potential flammulated owl habitat have been identified. However, more recent input from local biologists suggest that nest boxes may not be appropriate, but have not been excluded as an option.
2. For brown creeper, protect large patch sizes of old-growth Douglas fir and mixed confer habitat with large snags and deeply-furrowed trees for foraging; buffer of at least 80 m from logging activities.	**Accept in concept** Explanation: The Final EIS, Chapter 2 contains a detailed discussion of vegetation clearing actions and locations. Based on information provided by the Forest Service on vegetation type and age class, no old-growth habitat would be cleared under any action alternative analyzed. The only old-growth habitat identified within the inundation or relocation areas occurs in the upper reaches of The Pit River arm, where no vegetation would be removed by logging or other means. Private lands potentially available for purchase or conservation easements that include conifer forests with late-seral characteristics and several special-status species have been identified. However this recommendation is not directly applicable since "logging" is not the objective of the project, just a means to remove vegetation at key locations to meet other planning objectives
3. For black-throated gray warbler, protect dry slopes brushy understory beneath oak and coniferous trees, open conifer forests interspersed with shrubs or forest edges, or shrubby stands of trees.	**Accept in concept** Explanation: The Final EIS, including the Preliminary Environmental Commitments and Mitigation Plan Appendix, includes a discussion of mitigation measures developed in conjunction with USFWS that focus on acquisition of lands that would meet various mitigation objectives for a wide array of biological resources. A number of mitigation measures agreed to by the USFWS in a series of meetings ending in February 2014 emphasizes the value of Ponderosa pine and Mixed coniferous forest and other habitat types that offer unique and high quality habitat that would be acquired or otherwise protected and/or restored. Private lands potentially available for purchase or conservation easements that include diverse conifer forest habitats, including hardwood and chaparral components, have been identified.
4. For dark-eyed junco, protect moist coniferous forest edge with an herbaceous understory that remains green throughout the breeding season. Mechanical destruction of the herbaceous layer and intensive cattle grazing should be avoided during the breeding season (April through August).	**Accept in concept** Explanation: The Final EIS, including the Preliminary Environmental Commitments and Mitigation Plan Appendix, includes a discussion of mitigation measures developed in conjunction with USFWS that focus on acquisition of lands that would meet various mitigation objectives for a wide array of biological resources. A number of mitigation measures agreed to by the USFWS in a series of meetings ending in February 2014 emphasizes the value of Ponderosa pine and Mixed coniferous forest and other habitat types that offer unique and high quality habitat that would be acquired or otherwise protected and/or restored. As described in Chapter 2 of the Final EIS, removal of herbaceous vegetation will occur at selected locations, to varying degrees to accommodate for relocation of facilities. No cattle grazing occurs within the boundaries of the Whiskeytown-Shasta-Trinity National Recreation Area. Private lands potentially available for purchase or conservation easements that include diverse conifer forest habitats, including hardwood, chaparral, and herbaceous layer components, have been identified. Vegetation removal will be minimal and there is no cattle grazing authorized within the NRA
5. For fox sparrow, protect mixed conifer forest with shrubby understory and restore the natural fire cycle through controlled burns.	**Accept in concept** Explanation: The Final EIS, including the Preliminary Environmental Commitments and Mitigation Plan Appendix, includes a discussion of mitigation measures developed in conjunction with USFWS that focus on acquisition of lands that would meet various mitigation objectives for a wide array of biological resources. A number of mitigation measures agreed to by the USFWS in a series of meetings ending in February 2014 emphasizes the value of Ponderosa pine and Mixed coniferous forest and other habitat types that offer unique and high quality habitat that would be acquired or otherwise protected and/or restored. Private lands potentially available for purchase or conservation easements that include diverse conifer forest habitats, including hardwood and chaparral components, have been identified.

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Table 1. Responses to the Fish and Wildlife Coordination Act Recommendations for the Shasta Lake Water Resources Investigation (contd.)

USFWS Recommendation	Reclamation Response
V. Conservation Measures and Habitat Protection for CalPIF Focal Bird Species (contd.)	
A. Ponderosa Pine and Mixed Coniferous Forest (contd.)	
6. For golden-crowned kinglet, protect breeding habitat in subalpine spruce or fir forests and mixed coniferous-deciduous forests with cool, moist, fairly closed canopy. Minimize forest thinning. Manage for stands of spruce or subalpine fir at least 150 years of age and with high canopy cover. Manage for forest diversity instead of pure stands of pine.	**Not applicable** Explanation: This measure is not applicable to lands within the SLWRI Primary Study Area. Elevations in the primary study area range from about 400 feet above mean sea level to about 4,000 feet on the highest peaks adjacent to Shasta Lake. There is no subalpine spruce or fir forest within the Primary Study Area, although these habitats do occur on the upper slopes of Mt. Shasta, Cascade Mountains and the Trinity Alps. Golden-crowned kinglets do winter in the SLWRI Primary Study Area, and private lands potentially available for purchase or conservation easements that include diverse conifer forest, riparian, hardwood, and chaparral habitats have been identified.
7. For MacGillivray's warbler, protect riparian, Douglas fir, redwoods, chaparral, and clearcut sites with mixed coniferous and deciduous trees that provide dense undergrowth with well-developed understories and moderate cover. Manage for shrubby seral habitats and avoid mechanical shrub removal. Reduce grazing pressure.	**Accept in concept** Explanation: The Final EIS, including the Preliminary Environmental Commitments and Mitigation Plan Appendix, includes a discussion of mitigation measures developed in conjunction with USFWS that focus on acquisition of lands that would meet various mitigation objectives for a wide array of biological resources. A number of mitigation measures agreed to by the USFWS in a series of meetings ending in February 2014 emphasizes the value of Ponderosa pine and Mixed coniferous forest and other habitat types that offer unique and high quality habitat that would be acquired or otherwise protected and/or restored. Private lands potentially available for purchase or conservation easements that include diverse conifer forest habitats, including hardwood, chaparral, and herbaceous layer components, have been identified.
8. For olive-sided flycatcher, protect habitats with abundant high, open perches where late-seral stage forest and early-seral staged open-canopied habitat are juxtaposed. Manage with frequent, low intensity prescribed burns to decrease canopy; allow fires to burn and refrain from salvaging logging. Protect natural openings within old-growth forests with exposed rocks and south-facing slopes. Manage for a mosaic and diverse forest.	**Accept in concept** Explanation: The Final EIS, including the Preliminary Environmental Commitments and Mitigation Plan Appendix, includes a discussion of mitigation measures developed in conjunction with USFWS that focus on acquisition of lands that would meet various mitigation objectives for a wide array of biological resources. A number of mitigation measures agreed to by the USFWS in a series of meetings ending in February 2014 emphasizes the value of Ponderosa pine and Mixed coniferous forest and other habitat types that offer unique and high quality habitat that would be acquired or otherwise protected and/or restored. Private lands potentially available for purchase or conservation easements that include diverse conifer forest habitats, including hardwood, and chaparral habitats have been identified.
9. For pileated woodpecker, protect mature and old-growth dense coniferous forests, mixed forests, open woodland, or second growth habitats with an abundance of standing live, dead, or dying trees, snags, and stumps and a tall, closed canopy with large diameter trees. Retain logging residue and downed wood. Reduce habitat fragmentation.	**Accept in concept** Explanation: The Final EIS, including the Preliminary Environmental Commitments and Mitigation Plan Appendix, includes a discussion of mitigation measures developed in conjunction with USFWS that focus on acquisition of lands that would meet various mitigation objectives for a wide array of biological resources. A number of mitigation measures agreed to by the USFWS in a series of meetings ending in February 2014 emphasizes the value of Ponderosa pine and Mixed coniferous forest and other habitat types that offer unique and high quality habitat that would be acquired or otherwise protected and/or restored. Private lands potentially available for purchase or conservation easements that include diverse conifer forest habitats, including snags and downed wood components, have been identified.
10. For red-breasted nuthatch, protect mature to late-successional coniferous forests with the presence of old, diseased and dead trees. Mixed stands may include Douglas fir, white fir, spruce, hemlock, cedar or pine trees, and may involve a deciduous component as well. Manage for the presence of old, diseased, and dead trees. Maintain forest diversity including diseased and multi-aged trees.	**Accept in concept** Explanation: The Final EIS, including the Preliminary Environmental Commitments and Mitigation Plan Appendix, includes a discussion of mitigation measures developed in conjunction with USFWS that focus on acquisition of lands that would meet various mitigation objectives for a wide array of biological resources. A number of mitigation measures agreed to by the USFWS in a series of meetings ending in February 2014 emphasizes the value of Ponderosa pine and Mixed coniferous forest and other habitat types that offer unique and high quality habitat that would be acquired or otherwise protected and/or restored. Private lands potentially available for purchase or conservation easements that include diverse conifer forest habitats have been identified.
11. For Vaux's swift, protect ponderosa pine, Douglas fir, and mixed-conifer forests with the presence of large hollow snags, snags with broken tops, or old pileated woodpecker cavities for breeding. Preserve snags and ensure snag recruitment through controlled burns.	**Accept in concept** Explanation: The Final EIS, including the Preliminary Environmental Commitments and Mitigation Plan Appendix, includes a discussion of mitigation measures developed in conjunction with USFWS that focus on acquisition of lands that would meet various mitigation objectives for a wide array of biological resources. A number of mitigation measures agreed to by the USFWS in a series of meetings ending in February 2014 emphasizes the value of Ponderosa pine and Mixed coniferous forest and other habitat types that offer unique and high quality habitat that would be acquired or otherwise protected and/or restored. Private lands potentially available for purchase or conservation easements that include diverse conifer forest habitats have been identified.

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Table 1. Responses to the Fish and Wildlife Coordination Act Recommendations for the Shasta Lake Water Resources Investigation (contd.)

USFWS Recommendation	Reclamation Response
V. Conservation Measures and Habitat Protection for CalPIF Focal Bird Species (contd.)	
A. Ponderosa Pine and Mixed Coniferous Forest (contd.)	
12. For western tanager, preserve relatively open coniferous or mixed coniferous-deciduous forests. Manage for a diverse coniferous forest system.	**Accept in concept** Explanation: The Final EIS, including the Preliminary Environmental Commitments and Mitigation Plan Appendix, includes a discussion of mitigation measures developed in conjunction with USFWS that focus on acquisition of lands that would meet various mitigation objectives for a wide array of biological resources. A number of mitigation measures agreed to by the USFWS in a series of meetings ending in February 2014 emphasizes the value of Ponderosa pine and Mixed coniferous forest and other habitat types that offer unique and high quality habitat that would be acquired or otherwise protected and/or restored. Private lands potentially available for purchase or conservation easements that include diverse conifer forest habitats have been identified.
B. Oak Woodland 1. For acorn woodpecker, maintain large tracts of land to include a natural diversity of oak species or intraspecific oak varieties with different seeding phenologies to help avoid synchronous or wide geographic-scale crop failures. Protect large tracts of oak woodlands away from disturbance. Maintain a similar high density of snags and dead tree limbs, or soft-wooded live trees such as pines or sycamores (35 granary trees/100 ha, or 1 snag every 2.86 ha). Do not allow intensive grazing that limits the recruitment of new oaks. 2. For blue-gray gnatcatcher, protect open scrubby areas with diverse structure, including a mosaic of oaks and shrubs. Sites selected for protection should have beneficial adjacent land uses that minimize parasitism by brown-headed cowbird and predation by domestic cats, dogs, and raccoons. Beneficial adjacent land uses include wilderness areas, unimproved parks/open space provided substantial invasive species issues do not exist, grazed oak woodlands, and timber production forests. Detrimental adjacent land uses that promote brown-headed cowbird parasitism include urban/suburban development, rural homes/ranchettes, manicured parks and golf course, dairies, intensive feedlots, and active livestock grazing. 3. For lark sparrow, use controlled low-temperature burns to reduce the vegetative density of an area. Pesticide use should be restricted. Control invasive exotic grasses and restore with native plant species. Ground disturbance (*i.e.*, grazing, off-trail recreation, burning, and mowing) should be limited during the breeding season (March – August). 4. For western bluebird, protect sites with older trees with naturally occurring or previously excavated cavities. 5. For oak titmouse, protect areas of moderate canopy cover (40 – 70 percent) with natural cavities or holes previously excavated by woodpeckers. 6. For yellow-billed magpie, protect oak savanna, where large trees are found within large expanses of open ground; especially valley floors, gentle slopes and open park-like areas, including along stream courses or near a permanent water source.	**Accept in concept** Explanation: The Final EIS, including the Preliminary Environmental Commitments and Mitigation Plan Appendix, includes a discussion of mitigation measures developed in conjunction with USFWS that focus on acquisition of lands that would meet various mitigation objectives for a wide array of biological resources. A number of mitigation measures agreed to by the USFWS in a series of meetings ending in February 2014 emphasizes the value of oak woodlands and other habitat types that offer unique and high quality habitat that would be acquired or otherwise protected and/or restored. Private lands potentially available for purchase or conservation easements that include diverse oak habitats have been identified.
C. Mixed Chaparral	
1. For greater roadrunner, protect large areas with minimal human development that contain a mixture of shrub cover for nesting and open areas of low grasses for foraging and open habitat with minimal human development. Restrict pesticide use.	**Accept in concept** Explanation: The greater roadrunner is not a species that is known to occur in the SLWRI primary study area. However, the Final EIS, including the Preliminary Environmental Commitments and Mitigation Plan Appendix, includes a discussion of mitigation measures developed in conjunction with USFWS that focus on acquisition of lands that would meet various mitigation objectives for a wide array of biological resources. A number of mitigation measures agreed to by the USFWS in a series of meetings ending in February 2014 emphasizes the value of mixed chaparral and other habitat types that offer unique and high quality habitat that would be acquired or otherwise protected and/or restored. Although the Greater roadrunner does not occur in the SLRWI primary study area, private lands potentially available for purchase or conservation easements that include chaparral habitats have been identified that provide potential habitat for similar species.
2. For wrentit, protect areas with mature, dense shrub habitats; work to minimize fragmentation, and incorporate corridors connecting habitat fragments.	**Accept in concept** Explanation: The Final EIS, including the Preliminary Environmental Commitments and Mitigation Plan Appendix, includes a discussion of mitigation measures developed in conjunction with USFWS that focus on acquisition of lands that would meet various mitigation objectives for a wide array of biological resources. A number of mitigation measures agreed to by the USFWS in a series of meetings ending in February 2014 emphasizes the value of mixed chaparral and other habitat types that offer unique and high quality habitat that would be acquired or otherwise protected and/or restored. Private lands potentially available for purchase or conservation easements that include diverse chaparral habitats have been identified.

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Table 1. Responses to the Fish and Wildlife Coordination Act Recommendations for the Shasta Lake Water Resources Investigation (contd.)

USFWS Recommendation	Reclamation Response
V. Conservation Measures and Habitat Protection for CalPIF Focal Bird Species (contd.)	
C. Mixed Chaparral (contd.)	
3. For mountain quail, protect areas with an average distance to protective cover of 1.5 m, an average shrub cover of 46 percent, and availability of a permanent water source within 0.8 km (Winter 2002).	**Accept in concept** Explanation: The Final EIS, including the Preliminary Environmental Commitments and Mitigation Plan Appendix, includes a discussion of mitigation measures developed in conjunction with USFWS that focus on acquisition of lands that would meet various mitigation objectives for a wide array of biological resources. A number of mitigation measures agreed to by the USFWS in a series of meetings ending in February 2014 emphasizes the value of mixed chaparral and other habitat types that offer unique and high quality habitat that would be acquired or otherwise protected and/or restored. Private lands potentially available for purchase or conservation easements that include diverse chaparral habitats have been identified.
D. Montane Riparian	
1. For black-headed grosbeak, protect small riparian corridors (less than 200 meters in length and 20 -50 meters in width) along forest edges with cottonwood-willow associations, vegetation diversity, vertical complexity, and blackberry or wild grape for cover. Target old growth riparian forest, with large, shady oaks and cottonwoods, as well as in relatively open areas in early successional riparian zones and along levees. Pesticide use should be restricted.	**Accept in concept** Explanation: The Final EIS, including the Preliminary Environmental Commitments and Mitigation Plan Appendix, includes a discussion of mitigation measures developed in conjunction with USFWS that focus on acquisition of lands that would meet various mitigation objectives for a wide array of biological resources. A number of mitigation measures agreed to by the USFWS in a series of meetings ending in February 2014 emphasizes the value of montane riparian and other habitat types that offer unique and high quality habitat that would be acquired or otherwise protected and/or restored. Private lands potentially available for purchase or conservation easements that include diverse foothill/montane riparian habitats have been identified.
2. For willow flycatcher, prioritize the protection and restoration of riparian deciduous shrub vegetation, particularly willow thickets, and address the problem of cowbird parasitism.	**Accept in concept** Explanation: See Explanation V-D-1 above.
3. For common yellowthroat, protect marsh habitats with a riparian habitat corridor. Restrict livestock grazing and pesticide use. Minimize habitat disturbance from mid-April – September.	**Accept in concept** Explanation: See Explanation V-D-1 above. However, neither livestock grazing nor pesticide use is proposed under any SLWRI action alternative.
4. For song sparrow, protect early successional riparian habitat near marshy areas or running water with moderately dense vegetation, plenty of light, exposed ground or leaf litter for foraging, and plenty of blackberry and rushes for nesting. Stop channel incision (restore the water table) in places that a creek has incised.	**Accept in concept** Explanation: See Explanation V-D-1 above.
5. For Swainson's thrush, protect dense thickets (canopy closure 40-100 percent) near streams or wet meadows with abundant snags and 25-50 cm dbh live stems.	**Accept in concept** Explanation: See Explanation V-D-1 above.
6. For tree swallow, protect areas with fresh water, marshlands, or open areas, usually near water, including fields, marshes, shorelines, and wooded swamps with standing dead trees with nest cavities for nesting and aerial foraging.	**Accept in concept** Explanation: See Explanation V-D-1 above.
7. For yellow-breasted chat, protect dense early successional riparian thickets of willows with vine tangles of Himalayan blackberry, California wild rose, and pipevine and dense brush associated with streams, swampy ground and the borders of small ponds. Some taller trees (i.e., cottonwoods and alders) are required for song perches. Minimize logging.	**Accept in concept** Explanation: See Explanation V-D-1 above. However, protection of Himalayan blackberry (a non-native, invasive plant species) is inconsistent with Executive Order 11312 (invasive Species) and current BLM and Forest Service land management plans. This topic is discussed in a number of chapters of the Final EIS (2, 11, 12,13).
VI. Priorities for Project Benefits to Fish and Wildlife (USFWS 2007a)	
A. Meeting the ERP milestones for recovery of Chinook salmon and steelhead (CALFED Phase I condition of Biological Opinions and NCCP Determination).	**Accept**
B. Meeting the ERP milestones to benefit covered fish species.	**Accept in concept** Explanation: The SLWRI EIS tiers to the CALFED PEIS/R, and it relies on the analysis and screening evaluations performed for the CALFED PEIS/R. Specifically, the ERP was included as part of the CALFED Preferred Program Alternative. The primary objective of increasing the survival of anadromous fish in the Sacramento River is consistent with ERP milestones. However, it was beyond the scope of the SLWRI to meet all ERP milestones for covered fish species.
C. Meeting obligations for water supply under the EWA.	**Not applicable** Explanation: The EWA Operating Principles Agreement was originally executed between the five state and federal agencies in 2000, and in 2004 it was extended through December 31, 2007. The agreement was not extended past 2007, although Federal authorization continued through 2014.
D. Creating secure storage for EWA assets.	**Not applicable** Explanation: See Recommendation VI-C, above

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Table 1. Responses to the Fish and Wildlife Coordination Act Recommendations for the Shasta Lake Water Resources Investigation (contd.)

USFWS Recommendation	Reclamation Response
VI. Priorities for Project Benefits to Fish and Wildlife (USFWS 2007a) (contd.)	
E. Meet CVPIA AFRP flow standards (which are not always met on Sacramento River).	**Accept in concept** Explanation: As described in EIS Chapter 2, this operational scenario was evaluated during the formulation of CP4 and CP4A. However, quantitative analyses indicated this operational scenario was not as effective as dedicating additional water from increased storage (378,000 acre-feet under CP4 and 191,000 acre-feet under CP4A) to increase the size of the cold-water pool for fishery benefit. However, an adaptive management plan was included under CP4 and CP4A. This adaptive management plan may include operational changes to the timing and magnitude of releases primarily to improve the quality and quantity of aquatic habitat. These changes may include increasing minimum flows, timing releases from Shasta Dam to mimic more natural seasonal flows, meeting flow targets for side channels, or retaining the additional 191,000 acre-feet (for CP4A) or 378,000 acre-feet (for CP4) of water in storage to meet temperature requirements.
F. American River (meeting steelhead flow targets and other flow needs for lower American River and AFRP).	**Not accepted** Explanation: The SLWRI EIS tiers to the CALFED Programmatic PEIS/R. The SLWRI is one of five surface storage projects recommended for project specific studies in the 2000 CALFED PEIS/R Preferred Program Alternative and associated CALFED Programmatic ROD. The CALFED Programmatic ROD called for the Secretary of the Interior to conduct feasibility studies for expanding CVP storage in Shasta Lake to *"increase the pool of cold water available to maintain lower Sacramento River temperatures needed by certain fish and provide other water management benefits, such as water supply reliability."* Accordingly, action alternatives were not specifically formulated to address steelhead flow targets or other flow needs for the lower American River.
G. Meet Delta water quality requirements (Trinity River import reductions exacerbates this condition).	**Accept**
H. Provide for refuge water supplies for Level 2 and Level 4 water.	**Accept in concept** Explanation: Refuge Level 2 water supply requirements are included in the existing condition and No-Action Alternative and associated modeling and analysis. Level 2 water is the refuges' most reliable annual supply of water since Reclamation provides it to refuges from the CVP's annual water supplies. However, consistent with CVPIA Section 3406d(2), Incremental Level 4 water supply are acquired from willing sellers, and vary from year to year, depending on annual hydrology, water availability, water market pricing, and funding. Therefore, it would be speculative to predict or assume quantities and locations of annual acquisitions from willing sellers. Refuge water supplies under existing conditions, the No-Action Alternative, and action alternatives are presented and evaluated in Chapter 6 of the EIS. As shown in EIS Chapter 6, all action alternatives would increase refuge water supplies.
I. Provide for seasonal flow enhancements which could include flow releases that simulate natural seasonal flows and increased flows at various times of year to provide more suitable fish habitat and water temperatures. (See ERP proposed actions in Table D-1 of the Service's Programmatic Biological Opinion for CALFED).	**Accept in concept** Explanation: As described in EIS Chapter 2, multiple operational scenarios augmenting flows on the upper Sacramento River were evaluated during the formulation of CP4 and CP4A. However, quantitative analyses indicated these operational scenarios were not as effective as dedicating additional water from increased storage (378,000 acre-feet under CP4 and 191,000 acre-feet under CP4A) to increase the size of the cold-water pool for fishery benefit. However, an adaptive management plan was included under CP4 and CP4A. This adaptive management plan may include operational changes to the timing and magnitude of releases primarily to improve the quality and quantity of aquatic habitat. These changes may include increasing minimum flows, timing releases from Shasta Dam to mimic more natural seasonal flows, meeting flow targets for side channels, or retaining the additional 191,000 acre-feet (for CP4A) or 378,000 acre-feet (for CP4) of water in storage to meet temperature requirements.
VII. National Bald Eagle Management Guidelines (USFWS 2007b) Minimize adverse effects to the bald eagle by incorporating the avoidance and minimization measures identified in the National Bald Eagle Management Guidelines (USFWS 2007b). Construction activities should be timed and spaced to minimize effects during the following critical bald eagle nesting periods: nest building (most sensitive phase) in January – mid-April; egg laying/incubation in February – May; hatchling/rearing young in March – July.	**Accept**

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Table 1. Responses to the Fish and Wildlife Coordination Act Recommendations for the Shasta Lake Water Resources Investigation (contd.)

USFWS Recommendation	Reclamation Response
VIII. Invasive Species Reclamation should analyze the effects of the SLWRI on the spread of invasive species and develop mitigation measures to minimize their spread. Below are recommendations for controlling the spread of the New Zealand mud snail (CDFG 2008a).	
A. New Zealand Mud Snail 1. Have extra waders and boots for use in infested waters only. Store them separately. 2. After leaving the water inspect waders, boots, float tubes, boats and trailers, dogs and any gear used in the water. 3. Remove visible snails with a stiff brush and follow with a rinsing. 4. If possible, freeze or completely dry out wet gear before reuse. 5. Never transport live fish or other aquatic animals or plants from one body of water to another.	**Accept in concept** Explanation: Pages 2-42 of the Final EIS includes a discussion of environmental commitments related to this topic, but not this recommendation. The Final EIS includes Environmental Commitments to develop and require implementation of a control plan to prevent the introduction of zebra/quagga mussels, invasive plants, and other invasive species to project areas. Regarding field studies, standard decontamination procedures have been and will continue to be followed.
IX. Other Recommendations Reclamation should incorporate the recommendations in Appendix C (pp. 23 – 25) of this report that the Service provided in the February 17, 2007, Planning Aid Memorandum for the SLWRI (USFWS 2007a). Reclamation should also incorporate the appropriate conservation measures for CALFED MSCS species identified in the CALFED Programmatic Final EIR/EIS (CALFED 2000a,b) which are summarized in Appendix D of this report. Note: Recommendations A through U below are from the Planning Aid Memorandum for the SLWRI (USFWS 2007a).	
A. Evaluate the relationship of the effects of actions affiliated with the proposed SLWRI Project within primary and expanded project areas in the context of existing and relevant Biological Opinions.	**Accept**
B. Incorporate the principles and goals of relevant plans and statutes as outlined above (in "Related Projects, Actions, Plans and Initiatives," page 10).	**Accept in concept** Explanation: Recommended projects, actions, plans, and initiatives were considered during the plan formulation process, including identification and development of project objectives, planning considerations, and management measures. As many of the cited projects, actions, plans, and initiatives are over 20 years old, more recent information has also been used in study development and evaluations.
C. Consult and integrate the SLWRI with relevant CALFED-related Opinions and Objectives, including: the CALFED ROD Biological Opinion, the OCAP Biological Opinion, and the Service's Delta Native Fishes Recovery Plan.	**Accept**
D. Integrate the SLWRI analysis across the entire watershed, consistent with the interconnectedness associated with all major water projects within the larger CVP/SWP.	**Accept**
E. Clarify the intended use of increased yield from an enlarged Shasta Lake—provide specific operational commitments and details regarding the nature and timing for allocation of project benefits (water supply).	**Accept**
F. Evaluate fully the beneficial or detrimental influences an enlarged Shasta Lake will have on the EWA, AFRP flows and refuge water supply.	**Accept in part** Explanation: Generally, this recommendation was incorporated into the Draft EIS and Final EIS. Chapter 6 of the EIS provides detailed information on the water operations and deliveries, including timing and magnitudes. Detailed modeling simulations for all alternatives are included in the Modeling Appendix to the EIS. The EWA Operating Principles Agreement was originally executed between the five state and federal agencies in 2000 and in 2004 it was extended through December 31, 2007. The agreement was not extended past 2007, although Federal authorization continued through 2014. Incorporating flow augmentation based on AFRP flows into action alternatives was evaluated during the plan formulation process; quantitative results of this analysis can be found in the Plan Formulation Appendix. Refuge water supplies under existing conditions, the No-Action Alternative, and action alternatives are presented and evaluated in Chapter 6 of the EIS.
G. Fully evaluate and implement demand reduction measures to effectively increase water reliability short of dam elevation.	**Accept in part** Explanation: Demand reduction measures were evaluated in the Plan Formulation Appendix. A water use efficiency measure ("Reduce Demand") was included in all action alternatives. In addition, continued implementation and improvements in water use efficiency was included as part of the No-Action Alternative. Further, the SLWRI EIS tiers to the CALFED PEIS/R, it relies on the analysis and screening evaluations performed for the CALFED PEIS/R. While revisiting alternatives that were considered alongside CALFED's Preferred Program Alternative is not required, many of the management measures, including water use efficiency measures not related to the raising of Shasta Dam, were also evaluated during the SLWRI plan formulation process.

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Table 1. Responses to the Fish and Wildlife Coordination Act Recommendations for the Shasta Lake Water Resources Investigation (contd.)

USFWS Recommendation	Reclamation Response
IX. Other Recommendations (contd.)	
H. Evaluate construction and operation of an enlarged Shasta Lake within the larger context of the entire ISI, including the potential strategies for joint operations to best meet project objectives.	**Accept in part** Explanation: The enlargement of Los Vaqueros Reservoir to 160 TAF was included in the No-Action Alternative. Alternatives for the NODOS project remain under development and a draft or final Feasibility Report/EIS has not been released. The Upper San Joaquin River Basin Storage Investigation (Temperance Flat Reservoir) has not identified a preferred alternative/recommended plan and has not released a final Feasibility Report/EIS. Accordingly, Reclamation has not included NODOS or the Temperance Flat Reservoir in the No-Action Alternative. However, the NODOS project and the Temperance Flat Reservoir were considered in the cumulative effects analysis and was evaluated qualitatively. Further, the SLWRI EIS tiers to the CALFED PEIS/R, in which the storage projects were evaluated in development of the Preferred Program Alternative.
I. Fully integrate the objectives of CALFED into the SLWRI and ensure that operation and management of an enlarged Shasta Lake is aligned with CALFED. These considerations include the goals and regulatory responsibilities associated with the MSCS, ERP, and EWA within the larger WMS.	**Accept in part** Explanation: The SLWRI EIS tiers to the CALFED PEIS/R, and relies on the analysis and screening evaluations performed for the CALFED PEIS/R. The CALFED PEIS/R included the ERP as part of the Preferred Program Alternative. While revisiting alternatives that were considered alongside CALFED's Preferred Program Alternative is not required, many of the management measures encompassed within the ERP were also evaluated during the SLWRI plan formulation process. Reclamation evaluated all species included under the MSCS in the Draft and Final EIS. The EWA Operating Principles Agreement was originally executed between the five state and federal agencies in 2000, and in 2004 it was extended through December 31, 2007. The agreement was not extended past 2007, although Federal authorization continued through 2014.
J. Evaluate allocation of a portion of the increased storage from an enlarged Shasta Lake to meeting EWA demands.	**Not applicable** Explanation: The EWA Operating Principles Agreement was originally executed between the five state and federal agencies in 2000 and in 2004 it was extended through December 31, 2007. The agreement was not extended past 2007, although Federal authorization continued through 2014. Accordingly, EWA is not included in the No-Action Alternative or action alternatives in the SLWRI EIS.
K. Integrate the SLWRI with CVPIA objectives, including provision of AFRP flows, b(2) requirements, and Refuge Level 2 and Level 4 water supplies.	**Accept in part** Explanation: SLWRI action alternatives are consistent with the goals and objectives of the CVPIA. CVPIA Section 3406 b(2) and Refuge Level 2 water supply requirements are included in the existing condition and No-Action Alternative and associated modeling and analysis. Level 2 water is the refuges' most reliable annual supply of water since Reclamation provides it to refuges from the CVP's annual water supplies. However, consistent with CVPIA Section 3406d(2), Incremental Level 4 water supply acquisitions are acquired from willing sellers, and vary from year to year, depending on annual hydrology, water availability, water market pricing, and funding. Therefore, it would be speculative to predict or assume quantities and locations of annual acquisitions from willing sellers. Refuge water supplies under existing conditions, the No-Action Alternative, and action alternatives are presented and evaluated in Chapter 6 of the EIS. As shown in EIS Chapter 6, all action alternatives would increase refuge water supplies. As described in Plan Formulation Appendix Chapter 5, flow augmentation scenarios based on AFRP flows were evaluated during the formulation of CP4 and CP4A. However, quantitative analyses indicated that flow augmentation scenarios were not as effective as dedicating additional water from increased storage to increase the size of the cold-water pool (378,000 acre-feet under CP4 and 191,000 acre-feet under CP4A) for fishery benefit. However, an adaptive management plan was included under CP4 and CP4A. This adaptive management plan may include operational changes to the timing and magnitude of releases primarily to improve the quality and quantity of aquatic habitat. These changes may include increasing minimum flows, timing releases from Shasta Dam to mimic more natural seasonal flows, meeting flow targets for side channels, or retaining the additional 191,000 acre-feet (for CP4A) or 378,000 acre-feet (for CP4) of water in storage to meet temperature requirements.

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Table 1. Responses to the Fish and Wildlife Coordination Act Recommendations for the Shasta Lake Water Resources Investigation (contd.)

USFWS Recommendation	Reclamation Response
IX. Other Recommendations (contd.)	
L. Include among the suite of alternatives (within what is currently identified as "Comprehensive Plan 4, Mini-Raise, Environmental Restoration and Enhancement) an alternative that fully evaluates management of an enlarged Shasta Lake to meet fish and wildlife restoration and enhancement objectives. This alternative should specifically address the supply necessary to meet established recovery goals, and how allocation from an enlarged Shasta Lake could meet this demand.	**Accept in concept** Explanation: During the formulation of CP4 and CP4A, a full suite of operational scenarios was evaluated based on the ability to best meet fisheries objectives, as documented in the Plan Formulation Appendix. Quantitative analyses indicated that scenarios focused on dedicating additional water from increased storage to increase the size of the cold-water pool provided the greatest benefits to anadromous fish. Accordingly, CP4 and CP4A include dedicating a portion of the increased storage to increasing the size of the cold-water pool in Shasta Reservoir (378,000 acre-feet under CP4 and 191,000 acre-feet under CP4A). Additionally, both CP4 and CP4A include prioritized enhancement measures to benefit anadromous fish, including augmenting spawning gravel and restoring riparian, floodplain, and side channel habitat in the upper Sacramento River. Further, results of SALMOD modeling assuming that the CVPIA doubling goals were met are included in the Modeling Appendix as sensitivity runs for the No-Action Alternative and comprehensive plans.
M. Include in alternative analysis, an assessment of benefits of repairing/upgrading the Shasta Lake temperature control device (to maximum practical extent), and (if deemed practical) this action should be a part of all alternatives analyzed.	**Accept**
N. Analyze the potential for optimizing water management without an enlarged Shasta Dam.	**Accept**
O. Equally compare alternatives that involve raising the dam and include benefits for both water supply and fish and wildlife.	**Accept**
P. Incorporate fish-focused benefits into all action alternatives beyond the incidental benefit of an enlarged cold water pool with explicitly defined management guidelines.	**Accept in part** Explanation: All action alternatives jointly address both the primary objectives of increasing water supply reliability and anadromous fish survival and all action alternatives provide benefits to anadromous fish. However, different components/measures were incorporated into each action alternative based on the focus of the action alternative, as a way to make distinctions between costs and benefits. As shown above, CP1, CP2, and CP3 have a joint focus on anadromous fish survival and water supply reliability. Therefore, CP1, CP2, and CP3 primarily include measures that simultaneously address both primary objectives, such as increasing the conservation storage in Shasta Reservoir, and measures that would be required for construction and operations of any Shasta Dam raise, such as modification of hydropower facilities and the temperature control device. In contrast, CP4 and CP4A focus primarily on anadromous fish survival, and CP5 focuses more broadly on both the primary and secondary objectives. Accordingly, based on the focus of these alternatives, enhancement measures to benefit anadromous fish, including, augmenting spawning gravel and restoring riparian, floodplain, and side channel habitat in the upper Sacramento River were included only in CP4, CP4A, and CP5. Additionally, since CP4 and CP4A focus primarily on anadromous fish survival, operations for the increased storage under these action alternatives were formulated to maximize anadromous fish survival. Accordingly, CP4 and CP4A include dedicating a portion of the increased storage to increasing the size of the cold-water pool in Shasta Reservoir (378,000 acre-feet under CP4 and 191,000 acre-feet under CP4A).
Q. Ensure that the potential impacts identified above (Anticipated Fish, Wildlife and Habitat Impacts, page 17-20) are considered within the SLWRI planning process.	**Accept in concept** Explanation: Anticipated effects to fish, wildlife, and habitat were evaluated in the EIS. Recommended impact evaluations in the USFWS Planning Aid Memo helped frame initial scoping on the range of effects and associated evaluations. Further recommendations provided in the FWCA Report helped further refine impact analyses included in the EIS.
R. Anticipate, qualitatively or quantitatively (where appropriate) the impacts to potentially-affected species, as above (Species Potentially Affected, page 20). Include these impacts and any mitigating measures in all planning processes.	**Accept**
S. Ensure the results of surveys and studies recommended in Recommended Studies (page 21) are incorporated through the SLWRI process, to the extent that these are not yet initiated and ongoing	**Accept in concept** Explanation: The studies recommended by USFWS were conducted for the EIS and associated planning processes. Some studies were performed qualitatively, and other studies were performed quantitatively, using tools suggested in the list provided by USFWS (e.g., CalSim-II) and other tools not listed (e.g., the Sacrament River Water Temperature Model).
T. Evaluate potential mitigation strategies for the project, including those enumerated above (Potential Mitigation, page 20), and incorporate into planning processes.	**Accept**
U. Identify mitigation sites and/or strategies as soon as practical in order for the Service to complete the HEP analysis and incorporate the existing habitat utility measures collected during the HEP surveys.	**Accept in concept** Explanation: The USFWS worked closely with Reclamation, the Forest Service and other resource agencies to conduct a HEP analysis that was used to characterize the biological resources and analyze impacts. Through extensive dialogue as a member of Reclamation's PCT, the USFWS and other agencies agreed that the type and magnitude of mitigation required for SLWRI impacts on biological resources was not conducive to applying HEP with respect to mitigation. The USFWS participation in Reclamation's 2013/2014 mitigation planning process is documented in the Preliminary Environmental Commitments and Mitigation Plan Appendix of the Final EIS and is reflected in a wide array of mitigation measures.

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Table 1. Responses to the Fish and Wildlife Coordination Act Recommendations for the Shasta Lake Water Resources Investigation (contd.)

USFWS Recommendation	Reclamation Response
X. Additional Data Required More information is required related to the following before the Service can thoroughly evaluate the effects of the SLWRI on fish and wildlife resources. Data needed include:	
A. Details on habitat disturbance associated with each of the SLWRI alternatives 1. Location of aggregate mining and staging areas 2. Relocation sites of campgrounds, roads, bridges, marinas, etc. beyond the Inundation Zone	**Accept**
B. Ecosystem restoration defined in CP5	**Accept**
C. Definition of the allocation and use of the increased water supply reliability in each of the SLWRI alternatives	**Accept**
D. Clarify whether and quantify the extent that the cold water pool (378,000 af) in CP4 would be used to augment flows to provide additional benefits for fish and wildlife species. Specify the authority for those augmented flows, and identify if those flows would be at the discretion of the Service, NOAA Fisheries, and CDFG.	**Accept**
E. Salmod modeling data	
1. Analysis of assumptions and limitations.	**Accept**
2. Full sensitivity analysis of the variables in the model.	**Accept**
3. Analysis of alternatives considered but removed from further analysis (e.g., AFS-1, AFS-2, and AFS-3) with the recently revised version of Salmod.	**Accept**
4. Analysis of AFS-1, AFS-2, and AFS-3 with higher dam raises (i.e., 18 feet).	**Accept**
5. Analysis of effects of riparian restoration along the mainstem Sacramento River, the lower reaches of nonnatal tributaries, and further downstream (i.e., RBDD to Colusa) on survival rates of juvenile salmonids	**Accept in part** Explanation: Development of riparian restoration sites utilized CalSim-II and other hydraulic models, but did not use the SALMOD model. The geographic extent of the SALMOD model is along the mainstem of the Sacramento River, from Keswick to the Red Bluff Diversion Dam.
F. CALSIM II or other hydrological modeling data	
1. Analysis of the assumptions and limitations of CALSIM II.	**Accept**
2. Analysis of monthly flow data disaggregated into daily flows and how closely it simulates actual flood events on daily and weekly time steps.	**Accept**
3. Yolo and Sutter Bypasses daily flows---effects of reduced flood flows on hydroperiods.	**Accept in concept** Explanation: Daily flow data from the SRWQM for numerous locations between Shasta Dam and Knights Landing along the Sacramento River, including multiple weirs along the Sacramento River, was included in the Draft EIS.
4. Delta---analysis of the effects of the SLWRI alternatives on X2 location and inflow/export ratios as it relates to sensitive Delta aquatic species.	**Accept**
5. Sensitivity runs with and without NODOS (Sites Reservoir).	**Accept in part** Explanation: Alternatives for the NODOS project remain under development and a draft or final Feasibility Report/EIS has not been released. Accordingly, Reclamation has not conducted sensitivity runs. However, the NODOS project was considered in the cumulative effects analysis and was evaluated qualitatively.
6. Evaluation of other proposed CALFED water storage projects.	**Accept in part** Explanation: The enlargement of Los Vaqueros Reservoir to 160 TAF was included in the No-Action Alternative. The Upper San Joaquin River Basin Storage Investigation (Temperance Flat Reservoir) was considered in the cumulative effects analysis and was evaluated qualitatively.
7. Changes in the operation of other CVP/SWP dams and effects on temperature and flows downstream.	**Accept**

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Table 1. Responses to the Fish and Wildlife Coordination Act Recommendations for the Shasta Lake Water Resources Investigation (contd.)

USFWS Recommendation	Reclamation Response
X. Additional Data Required (contd.)	
F. CALSIM II or other hydrological modeling data (contd.)	
8. Analysis of the capability of improving temperature and flow conditions for anadromous fish in the Sacramento River without raising Shasta Dam.	
a. Modifications to the TCD	**Accept**
b. Operational changes at Shasta Dam	**Accept**
c. Riparian restoration associated with AFRP and SRCAF	**Accept in concept** Explanation: Riparian restoration actions associated with AFRP and SCRAF would not be expected to improve flow conditions. Although specific restoration actions were not incorporated into SRWQM, sensitivity analyses were conducted for SALMOD model parameters.
G. Evaluate the effects of changes in the timing, frequency, and duration of flood flows in the Sacramento River with the SLWRI on the following species/habitats using the SacEFT (ESSA Technologies Ltd. 2006). 1. Fremont cottonwood regeneration 2. Green sturgeon 3. Chinook salmon 4. Steelhead 5. Bank swallow 6. Northwestern pond turtle	**Accept in concept** Explanation: Potential effects to the specified species/habitats due to changes in flows in the Sacramento River under action alternatives were evaluated in the DEIS and Final EIS. However, these effects were evaluated with other tools, including flow and temperature estimates in the Sacramento River Water Quality Mode (cottonwood generation, green Sturgeon, steelhead, and bank swallow), SALMOD (Chinook salmon), and CalSim-II (pond turtles).
H. Evaluate the capabilities and benefits of riparian restoration opportunities along the Sacramento River and tributaries on fish and wildlife resources using the SacEFT (ESSA Technologies Ltd. 2006).	**Accept in concept** Explanation: Development of riparian restoration sites utilized CalSim-II and other hydraulic models, but did not use the SacEFT model.
I. Evaluate the effects of the SLWRI on fluvial processes in the Sacramento River using the daily Physical River Process model of the Sacramento River that Reclamation-Denver is currently developing.	**Accept in concept** Explanation: Effects of SLWRI alternatives on Sacramento River geomorphology were evaluated with other tools, including daily flow data from the Sacramento River Water Quality Model.
J. HEP data	
1. Provide data for each of the SLWRI alternatives on the acreage of each habitat type that would be lost within the Inundation Zone or disturbed by the relocation of campgrounds, marinas, roads, bridges, and other facilities.	**Accept in concept** Explanation: The USFWS worked closely with Reclamation, the Forest Service and other resource agencies to conduct a HEP analysis that was used to characterize the biological resources and analyze impacts. Through extensive dialogue as a member of Reclamation's PCT, the USFWS and other agencies agreed that the type and magnitude of mitigation required for SLWRI impacts on biological resources was not conducive to applying HEP with respect to mitigation. The USFWS participation in Reclamation's 2013/2014 mitigation planning process is documented in the Preliminary Environmental Commitments and Mitigation Plan Appendix of the Final EIS and is reflected in a wide array of mitigation measures.
2. Identify candidate mitigation sites.	**Accept in concept** Explanation: The USFWS worked closely with Reclamation, the Forest Service and other resource agencies to conduct a HEP analysis that was used to characterize the biological resources and analyze impacts. Through extensive dialogue as a member of Reclamation's PCT, the USFWS and other agencies agreed that the type and magnitude of mitigation required for SLWRI impacts on biological resources was not conducive to applying HEP with respect to mitigation. The USFWS participation in Reclamation's 2013/2014 mitigation planning process is documented in the Preliminary Environmental Commitments and Mitigation Plan Appendix of the Final EIS and is reflected in a wide array of mitigation measures.
K. Mitigation	
1. Potential mitigation sites	**Accept in concept** Explanation: The USFWS worked closely with Reclamation, the Forest Service and other resource agencies to develop mitigation measures, ratios, and related information. The USFWS participation in Reclamation's 2013/2014 mitigation planning process is documented in the Preliminary Environmental Commitments and Mitigation Plan Appendix of the Final EIS and is reflected in a wide array of mitigation measures.
2. Avoidance and minimization measures	**Accept**
3. Identify conservation measures.	**Accept in concept** Explanation: The USFWS worked closely with Reclamation, the Forest Service and other resource agencies to develop mitigation measures, ratios, and related information. The USFWS participation in Reclamation's 2013/2014 mitigation planning process is documented in the Preliminary Environmental Commitments and Mitigation Plan Appendix of the Final EIS and is reflected in a wide array of mitigation measures.

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Table 1. Responses to the Fish and Wildlife Coordination Act Recommendations for the Shasta Lake Water Resources Investigation (contd.)

USFWS Recommendation	Reclamation Response
X. Additional Data Required (contd.)	
L. USFS Survey and Manage Species (*e.g.*, Shasta snow-wreath, Shasta chaparral snail, Shasta hesperian snail, Shasta salamander) and CALFED MSCS species.	
1. Current distribution and population	**Accept in varying degrees** Explanation: Additional surveys and analyses have been conducted over the past several years to evaluate potential project effects to USFS Survey and Manage species and CALFED MSCS Species. These results are included in Chapters 12 and 13 of the Final EIS and respective attachments. Additional surveys and analysis are also on-going and the results will be incorporated into mitigation planning efforts.
2. What percent of the population and habitat would be lost or disturbed?	**Accept in concept** Explanation: Additional surveys and analyses have been conducted over the past several years to evaluate potential project effects to USFS Survey and Manage species and CALFED MSCS Species. These results are included in Chapters 12 and 13 of the Final EIS and respective attachments. Additional surveys and analysis are also on-going and the results will be incorporated into mitigation planning efforts. Reclamation is working closely with USFS and BLM to prepare a persistence analysis that will provide additional information to address this question as well as provide the USFS and BLM the information necessary to determine consistency of the SLWRI project with land management plans.
3. Habitat fragmentation	**Accept in concept** Explanation: See Explanation X-L-2 above.
4. Protection status and level of threats to other populations of the species	**Accept in concept** Explanation: See Explanation X-L-2 above.
5. Analysis of the effects of the SLWRI alternatives on CALFED MSCS species	**Accept in concept** Explanation: See Explanation X-L-2 above.
M. Data on location of abandoned mines and analysis of the effects of inundation	**Accept**
N. Effects of climate change	**Accept**
O. Monitoring and adaptive management plan	**Accept**
P. Effects of the recent OCAP ruling on the SLWRI	**Accept**
Q. Growth-inducing effects from increased water supply reliability within the CVP-SWP water service areas 1. Conversion of natural lands into agriculture or urban sprawl 2. Conversion of agricultural lands into urban sprawl 3. Changes in crop cultivation based on increased water supply reliability	**Accept**

Key:
ACID = Anderson-Cottonwood Irrigation District
af = acre feet
AFRP = Anadromous Fish Restoration Program
BLM = U.S. Department of the Interior, Bureau of Land Management
CALFED= CALFED Bay-Delta Program
CalPIF = California Partners in Flight
CAR = Coordination Act Report
CDFG= California Department of Fish and Game
CDFW= California Department of Fish and Wildlife
cfs = cubic feet per second
cm dbh = centimeter diameter at breast heigh
CVP= Central Valley Project
CVPIA= Central Valley Project Improvement Act
Delta= Sacramento-San Joaquin Delta
EIS= Environmental Impact Statement
ERP = Ecosystem Restoration Program
EWA = Environmental Water Account
FCWAR = Fish and Wildlife Coordination Act Report
FERC = Federal Energy Regulatory Commission
FWCA = Fish and Wildlife Coordination Act
HEP = Habitat Evaluation Procedure
ISI = Integrated Storage Investigation
m = meter
MSCS = Multi-Species Conservation Strategy
NCCP = Natural Community Conservation Plan
NGO = nongovernmental organization
NMFS = National Marine Fisheries Service
NOAA = National Oceanic and Atmospheric Administration
NODOS = North-of-Delta Offstream Storage
OCAP = Operations Criteria and Plan
PCT = Project Coordination Team
PEIS/R = Programmatic Environmental Impact Statement/Environmental Impact Report
PG&E = Pacific Gas and Electric Company
RBDD = Red Bluff Diversion Dam
Reclamation = U.S. Department of the Interior, Bureau of Reclamation
RHJV = Riparian Habitat Joint Venture
RM = river mile
ROD = Record of Decision
SLWRI = Shasta Lake Water Resources Investigation
SRCAF = Sacramento River Conservation Area Forum
SWP = State Water Project
TAF = thousand acre-feet
TCD = temperature control device
USFS = U. S. Forest Service
USFWS = U.S. Fish and Wildlife Service
WMS = water management strategy
X2 = salinity isopleth

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Chapter 2
References

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