

# Chapter 14

## Cultural Resources

This chapter describes the affected environment and environmental consequences related to cultural resources for the dam and reservoir modifications proposed under SLWRI action alternatives. More detailed discussion of cultural resources is presented in *Cultural Resources Alternatives Assessment for the Shasta Lake Water Resources Investigation, Shasta and Tehama Counties, California* (Byrd et al. 2008) and *Native American Tribal Coordination, Shasta Lake Water Resources Investigation, California* (Nilsson et al. 2008), which were prepared for the project. These Technical Reports will not be publicly distributed because they contain confidential information on the locations of cultural resources.

### 14.1 Affected Environment

For the cultural resources assessment, studies were limited to the Shasta Lake and vicinity (77,088 acres) and the upper Sacramento River (16,113 acres), for a total of 93,201 acres (Byrd et al. 2008). Project impacts to cultural resources are not expected to extend beyond this primary study area. Shasta Lake and vicinity includes the existing reservoir, the maximum inundation area, and a 0.25-mile buffer. The 0.25-mile buffer encompasses the area around the reservoir where infrastructure would need to be relocated (recreation facilities, roads, utilities, trails, etc.). The majority of lands in the reservoir area are under Federal ownership and management responsibilities, and a detailed discussion of this topic can be found in Chapter 17. The upper Sacramento River is defined by the 100-year floodplain from Keswick Dam, north of Redding, southward to the Red Bluff Pumping Plant.

To evaluate the potential effects that the proposed undertaking may have on cultural resources within the 93,201-acre study area, archival and records searches were conducted. Information concerning potential Native American concerns within the study area was gathered from historic and ethnographic literature and from initial discussions with tribes and Native American individuals. The results of these efforts are summarized below, following a brief discussion of the regional context.

#### 14.1.1 Regional Setting

This section provides a regional framework of the study area including sections on the prehistoric, ethnohistorical, and historical context of the study area. Because of the regional nature of cultural resources, the Shasta Lake vicinity and upper Sacramento River area are discussed together.

1                   ***Prehistoric Context***

2                   The following presentation provides a temporally organized discussion of the  
3                   archaeological record. There is a long history of archaeological investigations in  
4                   the upper Sacramento Valley region, although the early investigations were  
5                   sporadic rather than sustained research programs. Notably, a great deal of  
6                   fieldwork has been carried out around Shasta Lake, largely on USFS lands.  
7                   Radiocarbon dating and temporally diagnostic artifacts have been used to create  
8                   a framework for understanding the age of cultural resources in the area as well  
9                   as changes through time. This framework provides baseline information on  
10                  how cultural resources can contribute to history and regional research issues.

11                  The Terminal Pleistocene time segment (ca. 13,500-11,600 before present,  
12                  calibrated using radiocarbon dating (cal BP)) is minimally represented and  
13                  poorly understood in this region. What little evidence exists suggests that people  
14                  passing through the area were wide-ranging, mobile hunters and gatherers who  
15                  periodically exploited large game (Haynes 2002). Archaeological data from  
16                  this time period, primarily represented by isolated fluted and/or bifacially  
17                  thinned spear points and Pleistocene fauna remains, is limited to two cave sites  
18                  in the study area.

19                  The earliest evidence for occupation of the region largely falls between ca.  
20                  8000-5000 BP. Most assemblages dating to this interval are affiliated with the  
21                  Borax Lake Pattern (Fredrickson 1974) and include wide-stemmed projectile  
22                  points, handstones, milling slabs, ovoid flake tools, along with a variety of other  
23                  utilitarian items. The diversified nature of these artifact assemblages indicates  
24                  people occupying the area were likely foragers who moved their residential  
25                  bases frequently to exploit seasonal changes in resource distribution  
26                  (Hildebrandt and Hayes 1983, 1993; Kowta et al. 2000; Sundahl and Henn  
27                  1993).

28                  Several new projectile point forms appeared in the archaeological record around  
29                  5000 BP, including Squaw Creek Contracting-stemmed, Pollard Diamond-  
30                  shaped, and McKee series. These points have been assigned to the Squaw  
31                  Creek Pattern (5700-3200 BP) by Sundahl (1992b). Despite the appearance of  
32                  these new forms, similarities in the rest of the assemblage composition with the  
33                  preceding Borax Lake Pattern suggest people occupying the area during this  
34                  time period were also relatively mobile foragers (Basgall and Hildebrandt 1989,  
35                  Kowta et al. 2000).

36                  A major change in the regional settlement-subsistence pattern appears to have  
37                  occurred between ca. 4,000 to 1,600 years ago. This period has been identified  
38                  as the Whiskeytown Pattern (Sundahl 1992b), and is represented by a wide  
39                  range of corner- and side-notched projectile points assigned to the Klikapudi  
40                  series, as well as hand stones, milling slabs, notched pebble net weights, and  
41                  mortars and pestles (see also the Deadman and Kingsley complexes in Tehama  
42                  County; Greenway 1982, Johnson 1984). Analysis of data from archaeological  
43                  sites dating to this time period, has led Basgall and Hildebrandt (1989) to

1 propose a shift from the preceding generalized forager strategy to a “fission-  
2 fusion” model of subsistence-settlement where larger groups of people occupied  
3 residential camps during the fall and winter months, but then split into smaller  
4 foraging groups who moved between productive resource patches during the  
5 remainder of the year. The fall-winter residential sites are thought to have been  
6 concentrated along the northern Sacramento Valley foothills, where salmon and  
7 acorns could be readily obtained (Baker 1990, Bevill and Nilsson 1993, Sundahl  
8 1999).

9 Two distinct patterns have been identified as corresponding with the most  
10 recent time period (from 1,600 years ago to contact) in the region. The first,  
11 referred to as the Augustine Pattern/Shasta Complex, is thought to reflect a  
12 more sedentary subsistence-settlement adaptation than what was practiced in the  
13 preceding time periods. Initially, from 1,250 to 750 years ago, square-stemmed  
14 Gunther Barbed projectile points (with lower frequencies of expanding-stem  
15 variants), winged drills, bipointed fish gorges, bone gaming pieces, incised bone  
16 pendants, and varied shell beads are characteristic. These materials have been  
17 associated with the arrival of the Wintu in Northern California, and are thought  
18 to reflect a sedentary adaptation made possible by a subsistence system  
19 dependent on the large-scale storage of salmon and acorns (Broughton 1988;  
20 George 1981; Sundahl 1982, 1992a; Wohlgemuth 1992).

21 During this same time frame, a contrasting record is found in upland areas  
22 surrounding the northern Sacramento Valley. It is represented by much smaller  
23 sites and rather simple assemblages consisting of small side- and corner-notched  
24 projectile points, a limited number of Gunther series forms, hopper mortars and  
25 pestles, hand stones, milling slabs, and notched pebble weights. On the east side  
26 of the valley, these findings are assigned to the Tehama Pattern (Clewett and  
27 Sundahl 1982, Sundahl 1992a), and are thought to reflect a more mobile pattern  
28 of settlement by populations speaking Hokan languages (e.g., Yana) pushed to  
29 the hinterlands by the late-arriving Wintu, who ultimately restricted access to  
30 the Sacramento River.

### 31 ***Ethnohistorical Context***

32 Ethnohistorical investigations indicate that at the end of the prehistoric era and  
33 into the historic era, much of the study area was primarily occupied by the  
34 Wintu (LaPena 1978), but some of their territorial boundaries have been  
35 contested for many years. The most commonly accepted map of Wintu territory  
36 was produced by Du Bois (1935), and shows that the Wintu controlled the  
37 Sacramento, McCloud, and Squaw Creek drainages, and all but the easternmost  
38 segment of the Pit River Arm. This arm crosses into a boundary area between  
39 Northern Yana (Johnson 1978, Sapir and Spier 1943) and Achomawi (Pit River)  
40 tribes (Olmsted and Stewart 1978). Wintu people also lived along the  
41 Sacramento River from Shasta Dam down to the confluence of the river with  
42 Cottonwood and Battle creeks. Nomlaki territory took over south of  
43 Cottonwood Creek/Battle Creek and extended down past what is now the Red  
44 Bluff Pumping Plant (Goldschmidt 1951, 1978).

1 There has been a great deal of ethnohistoric and ethnographic discussion of the  
2 Wintu owing largely to the records amassed by late nineteenth- and early  
3 twentieth-century observers. Therefore, the Wintu can be considered one of the  
4 best known Native American groups in California. Most of the villages were  
5 located on the McCloud and Pit rivers and the general area south of the Pit  
6 River to just south of Redding. One hundred and six (43 percent) of the named  
7 Wintu ethnographic villages fall within the current study area.

### 8 ***Historical Context***

9 The area that would become Shasta and Tehama counties was not explored by  
10 Europeans during the Spanish period of California history. Initial exploration  
11 occurred in 1821 when a Mexican expedition explored the Sacramento River  
12 nearly as far north as the future site of Redding, encountering Native  
13 populations as they traversed the region. Subsequently, European trappers in  
14 Northern California spread European diseases that had disastrous effects on the  
15 Native Americans. Notably, a devastating epidemic spread through the  
16 Sacramento Valley during the 1830s that may have killed as much as 75 percent  
17 of the native population.

18 In 1848, mining (especially for copper) began along the Trinity River and other  
19 Sacramento River tributaries, bringing as many as 50,000 people to the area.  
20 American immigrants increasingly occupied territory, and new logging and  
21 mining operations destroyed hunting grounds and salmon fisheries that were  
22 part of the traditional home of Native Americans such the Wintu. Criminal  
23 violence and the policy of relocation to reservations nearly eliminated the  
24 Native American population in the upper Sacramento River Valley by 1870.  
25 Those who remained lived in the mountains, like the Wintu, who maintained a  
26 salmon fishery along the McCloud River.

27 The mining boom led to the construction of smelters, mills, and towns (such as  
28 Keswick) that flourished in the late 1800s and early 1900s. Falling copper  
29 prices, growing environmental concerns over pollution from smelters, and the  
30 U.S. Government's efforts at protection and conservation of public lands ended  
31 major operations by the 1920s.

32 Logging started in 1852 and included sugar pine, white pine, red fir, and cedar.  
33 Sawmills quickly sprang up, along with associated roads. Transporting logs and  
34 milled lumber became easier after the completion of the railroad through Red  
35 Bluff and Redding, and the Blue Ridge Flume, completed in 1874. These  
36 transportation advances allowed lumber milling to be concentrated in the valley,  
37 and Red Bluff and other mill towns to thrive.

38 Agriculture dominated the valley land along the Sacramento River. Cattle  
39 farming was key initially, and remained an important product in the area  
40 through the mid-twentieth century, especially with the development of the dairy  
41 industry. Early settlers practiced dry farming, growing wheat and fruit,  
42 including peaches, pears, and plums. Farmers later diversified and transitioned

1 from wheat to fruits, nuts, vineyards, and vegetable crops in the late 1800s  
2 through the 1920s. Ultimately, intensive irrigated agriculture dominated the  
3 area.

4 Throughout the historic era, transportation was an important focus of  
5 infrastructure development. Over time, foot travel and transportation by horse  
6 or stage coach on a number of historic trails gave way to river, railroad, and  
7 ultimately, automobile travel. Hopeful settlers and miners poured into the study  
8 area along the California-Oregon Trail between 1840 and 1860, passing  
9 thorough the upper Sacramento River and Pit River valleys. A segment of the  
10 Siskiyou Trail was used by the northern railroad in 1877 and Interstate 5  
11 follows this route today. Many early roads in the study area operated in  
12 conjunction with ferries across the Sacramento River. Several important bridges  
13 are located in the study area, along with the remains of many others, including  
14 the Centennial Bridge in Red Bluff and the Dog Creek Bridge in Shasta County.

15 Towns such as Red Bluff, Redding, Keswick, and Kennett boomed, along with  
16 the region's developing transportation network. The construction of Shasta and  
17 Keswick dams promoted a new period of prosperity that carried through the  
18 expansion of the lumber industry and the rise of the recreation industry in the  
19 mid-twentieth century.

20 Efforts to preserve the Nation's forests began in the late 1800s. The Shasta  
21 Forest Reserve was created in 1905. The area also included many homesteads  
22 and Indian allotments granted to local Wintus in the 1880s. In preparation for  
23 inundation by Shasta Lake, the United States purchased land including these  
24 allotments, homesteads, and many other properties in the late 1930s. Around  
25 the same time, fish were recognized as an important natural resource in  
26 California, and the first of several salmon fish hatcheries were constructed in  
27 1872 at the salmon spawning grounds near the confluence of the McCloud and  
28 Pit rivers.

29 Recreation, especially in the mountains, also played an important role in the  
30 region's history. In the early twentieth century, private fishing clubs, such as  
31 the Bollibokka Club, flourished. In the 1930s, USFS began to encourage the  
32 recreational use of the forests by the broader public, constructing campgrounds  
33 and picnic areas. Recreation in the national forests expanded with the formation  
34 of Shasta Lake. New campgrounds were added, along with boat launches and  
35 access roads.

36 Hydroelectric power and water storage were also important facets of the  
37 region's history. Starting in 1922, Pacific Gas and Electric Company built dams  
38 and power plants in the Pit River area. In 1935, the Federal Government  
39 decided to proceed with building the Central Valley Project to store and deliver  
40 Sacramento River water as far south as Fresno County. Work was completed in  
41 the 1940s at Shasta Dam and Keswick Dam and Powerhouse, located downriver  
42 from Shasta Dam. Power generated at Shasta Dam and transmitted to the

1 Central Valley Project pumps provided electricity to supply the lift pumps  
2 raising water into the main canal system. The system used the natural channels  
3 of the Delta to move water from Redding to Tracy, the head of the Delta-  
4 Mendota Canal.

#### 5 **14.1.2 Archaeological Resources and Historical Structures**

6 This section discusses known archaeological resources and historic structures  
7 within the primary study area.

##### 8 ***Shasta Lake and Vicinity***

9 A total of 134 cultural resources studies have been previously conducted that  
10 intersect or are fully contained within the Shasta Lake area. Of these, 80 percent  
11 were surveys, the remainder being overview/research designs, excavations, or  
12 other compliance reports. More than half of the surveys are considered to have  
13 had systematic coverage; the rest were either reconnaissance efforts or the  
14 methods were unknown. Overall, only 8 percent of the study area has been  
15 surveyed; 5 percent in a systematic manner and 3 percent using reconnaissance  
16 methods.

17 The records search identified 261 cultural resources within the study area,  
18 including 190 prehistoric sites, 45 historic-era resources, and 26 resources with  
19 both prehistoric and historic-era components.

20 The 215 recorded prehistoric-era resources and components are widely  
21 distributed throughout the study area and include the following:

- 22 • Forty-two major residential sites
- 23 • Thirty-seven residential sites
- 24 • Fifty-five artifact scatters
- 25 • Seventy-seven scatters of flaked stone tools and manufacturing debris
- 26 • Two caves
- 27 • Two sites of unknown character

28 The 71 recorded historic-era resources and components include the following:

- 29 • Thirteen structures, including seven bridges, one dam, one railroad  
30 bridge and grade, one aerial-tramway, one rock wall/alignment  
31 complex, one building foundation, and one concentration of wooden A-  
32 frames
- 33 • Seven linear features consisting of one railroad, five road segments and  
34 one line of wooden poles

- 1                   • Seven mining locales that include two quarries and five sites with  
2                   various mining-related features and residential elements.
- 3                   • Fifteen artifact scatters
- 4                   • Two ranching complexes
- 5                   • Fourteen residential sites
- 6                   • Two town complexes – both are mining-related and one includes a  
7                   cemetery
- 8                   • Two orchards represented by wooden poles and fruit trees
- 9                   • One cemetery represented by two grave stones
- 10                  • Seven historic-era Native American cemeteries, all but one of which is  
11                  also associated with a major prehistoric residential component. Each of  
12                  these cemeteries was subject to government removal of burials and  
13                  reburial in a government cemetery outside the Shasta Lake inundation  
14                  area and the current project area.
- 15                  • One historic-era Native American residential site that also has a  
16                  prehistoric residential component

17                  Another 19 historic-era cemeteries (containing both Native American and Euro-  
18                  American burials) within the footprint of Shasta Lake have not been formally  
19                  recorded. They were subject to burial removal and subsequent reburial outside  
20                  the reservoir area. It is possible that a number of these cemeteries may retain  
21                  additional human remains, and are potentially subject to periodic exposure  
22                  when the reservoir level fluctuates.

23                  The vast majority of cultural resources discussed above have never been  
24                  formally evaluated with respect to the eligibility for listing on the National  
25                  Register of Historic Places (NRHP). The NRHP (also referred to as the National  
26                  Register) is the Nation's official list of cultural resources worthy of  
27                  preservation. Authorized under the National Historic Preservation Act of 1966,  
28                  the NRHP is part of a national program to coordinate and support public and  
29                  private efforts to identify, evaluate, and protect our historic and archeological  
30                  resources. Properties listed in the NRHP include districts, sites, buildings,  
31                  structures, and objects that are significant in American history, architecture,  
32                  archeology, engineering, and culture. All properties and districts listed in or  
33                  determined eligible for listing in the NRHP must be considered in the planning  
34                  of Federal undertakings.

35                  Only a single cultural resource, the Dog Creek Bridge, is currently listed on the  
36                  National Register. A second cultural resource, Shasta Dam and property, has

1           been determined eligible for the NRHP as part of the Central Valley Project  
2           through a consensus determination with the State Historic Preservation Officer  
3           (SHPO). Another 24 resources have been determined ineligible by consensus  
4           determination with SHPO. These include 15 historic-era resources, seven  
5           prehistoric sites, and two resources with both prehistoric and historic-era  
6           components. The remaining cultural resources have yet to be evaluated with  
7           respect to their eligibility for listing on the National Register.

8           ***Upper Sacramento River (Keswick Dam to Red Bluff)***

9           Based on the records search results, 97 cultural resources studies intersect or are  
10          fully contained within this area. Of these, 86 percent are surveys, along with  
11          overviews, excavation reports, and historical architectural evaluation reports.  
12          Most of the surveys had systematic coverage methods (75 percent). In all, 23  
13          percent of the area has been surveyed, mostly by systematic methods (15  
14          percent), and the rest by reconnaissance methods.

15          A total of 79 recorded cultural resources fall within this area. These include 45  
16          prehistoric sites, 20 historic-era resources, and 14 resources with both historic-  
17          era and prehistoric components.

18          The 59 prehistoric resources and components within the study area include the  
19          following:

- 20                 • Thirteen major residential sites
- 21                 • Twenty-two residential sites
- 22                 • Seven rock shelters
- 23                 • Five artifact scatters.
- 24                 • Five flaked stone tool and manufacturing debris scatters
- 25                 • Four rock art (petroglyph) sites
- 26                 • Three sites of unknown character

27          The recorded prehistoric sites are concentrated in the southern portion of the  
28          study area, from Battle Creek near Table Mountain southward (71 percent),  
29          along with a small concentration of sites at the northern end of the upper  
30          Sacramento River area near Redding (18.6 percent). Eleven prehistoric sites  
31          have been subjected to some form of archaeological excavation.

32          The 34 recorded historic-era resources and components within the study area  
33          include the following:



- 1                   • Ten structures
- 2                   • Seven linear features consisting of five roads, one wagon train, and a
- 3                   powerline
- 4                   • Five flume remnants (two of which were associated with orchards)
- 5                   • Three mining locales, including a mining complex and two adits
- 6                   • Five artifact scatters
- 7                   • One ranching complex
- 8                   • The historic-era structures include five bridges, a ferry crossing, a rock
- 9                   wall, a dam, one concrete dance pavilion, and a power substation
- 10                  building complex
- 11                  • Three historic-era Native American residential sites

12                  One archaeological site (referred to as the Benton Track Site or *Magma*) is  
13                  currently listed on the NRHP. In addition, the Diestelhorst Bridge in Redding  
14                  and the Anderson-Cottonwood Irrigation District Diversion Dam have been  
15                  determined eligible for the NRHP. Two sites are listed as ineligible for the  
16                  NRHP by the California Office of Historic Preservation.

### 17   **14.1.3 Native American Resources**

18                  A strong likelihood exists that other important Native American heritage  
19                  locations are present within the study area, based on ethnohistoric data and  
20                  initial discussions with Native Americans. The study area was the focus of  
21                  intensive Native American occupation during historic times, with a variety of  
22                  religious, economic, historic, and other values identified by Native American  
23                  groups. Ten groups, including those listed by the Native American Heritage  
24                  Commission, represent Native American interests in the study area. They  
25                  include the Grindstone Indian Rancheria, Paskenta Band of Nomlaki Indians,  
26                  Pit River Environmental Council, Pit River Tribe of California, Redding  
27                  Rancheria, Shasta Nation, United Tribe of Northern California, Inc., Winnemem  
28                  Wintu Tribe, Wintu Educational and Cultural Council, and the Wintu Tribe of  
29                  Northern California. Notably, the Winnemem Wintu and the Pit River tribes  
30                  live within the Shasta Lake area, where they continue to actively practice many  
31                  aspects of their traditional culture. Both groups have related that a complex  
32                  cultural landscape of village sites, ceremonial areas, burial sites, and resource  
33                  areas intersects the study area.

#### 34                  ***Traditional Cultural Properties***

35                  Federal regulation defines Traditional Cultural Properties as properties that have  
36                  “association with cultural practices or beliefs of a living community that (a) are  
37                  rooted in that community’s history, and (b) are important in maintaining the

1 continuing cultural identity of the community” (Parker and King 1998).  
2 Examples of Traditional Cultural Properties include: a location associated with  
3 the traditional beliefs of a Native American group about its origins, its cultural  
4 history, or the nature of the world; a location where Native American religious  
5 practitioners have historically gone, and are known or thought to go today, to  
6 perform ceremonial activities in accordance with traditional cultural rules of  
7 practice.

8 The records search at the Information Center revealed that no Traditional  
9 Cultural Properties have been formally recorded in the study area.

### 10 **Sacred Sites**

11 Executive Order No. 13007 defines a sacred site as "any specific, discrete,  
12 narrowly delineated location on Federal land that is identified by an Indian  
13 tribe, or Indian individual determined to be an appropriately authoritative  
14 representative of an Indian religion, as sacred by virtue of its established  
15 religious significance to, or ceremonial use by, an Indian religion; provided that  
16 the tribe or appropriately authoritative representative of an Indian religion has  
17 informed the agency of the existence of such a site.”

18 Executive Order 13007 pertains only to Federally recognized tribes and  
19 Federally managed lands. For groups that are not formally recognized, sacred  
20 areas may be listed in the Sacred Lands files of the California Native American  
21 Heritage Commission. This commission has reviewed its files and identified  
22 sacred lands within the study area. Their locations are confidential.

23 Tribal consultation has clearly indicated that local Native American groups are  
24 deeply concerned regarding the environmental and cultural effects of the  
25 project. Native Americans who supplied information for the SLWRI were, by  
26 and large, unwilling to provide comprehensive information on Traditional  
27 Cultural Properties within the study area at this point in the investigation. They  
28 did, however, provide some general information on the number of potential  
29 Traditional Cultural Properties in the general region, and these statements are  
30 well supported by ethnohistoric studies.

31 Members of the Pit River Madesi Band stated that 22 ethnographic villages and  
32 associated burial grounds are located within the existing reservoir and proposed  
33 reservoir areas. One tribal member also noted that several Traditional Cultural  
34 Properties exist within the Pit 6 and Pit 7 Dam areas.

35 The Winnemem Wintu have identified important localities within the study  
36 area, many of which are locations where ceremonies are regularly conducted.  
37 Along the McCloud River, these include Children’s Rock, Coyote Rock,  
38 Dekkas Rock, doctoring pools near Nawtawaket Creek, Eagle Rock and  
39 Samwel Cave, Hirz Bay, *Kaibai* village, North Gray Rocks, Puberty Rock,  
40 Saddle Rock, and *Watawacket* village and spiritual area. Along the Sacramento  
41 River, important localities include the Antlers area, Delta area, Doney Creek,

1 Gregory Creek, LaMoine area, Packers Bay, Pollard’s area, middle Salt Creek,  
2 and Sims area. The Winnemem Wintu have strong traditional and contemporary  
3 connections with the land, and their ongoing use of many archaeological and  
4 religious sites is fundamental to the well-being of their culture, particularly the  
5 education of their youth.

6 The Winnemem Wintu have also documented the location of some 155  
7 ancestral villages within the Shasta Lake area. At least 81 village locations are  
8 known along the lower McCloud River and lower Pit River. An additional 73  
9 villages are known to have existed on the eastern side of the Sacramento River.  
10 These village locations once contained between one and 30 houses each, some  
11 had associated cemeteries, and each had a power place. Some of these villages  
12 are already under the waters of Shasta Lake, while others are just above the  
13 current Shasta Lake water level. The Winnemem Wintu have estimated that 120  
14 of the known villages are still accessible (above the current high-water line).

## 15 **14.2 Regulatory Framework**

16 Under Federal and State law, effects to significant cultural resources—which  
17 include archaeological remains, historic-period structures, and Traditional  
18 Cultural Properties—must be considered as part of the environmental analysis  
19 of a proposed project. This section provides a summary of key regulations for  
20 the protection of significant resources.

### 21 **14.2.1 Federal**

22 Under Section 106 of the National Historic Preservation Act (NHPA), Federal  
23 agencies must consider effects to eligible resources (“historic properties”) from  
24 the proposed undertaking, in consultation with SHPO and other parties. This  
25 includes affording the Advisory Council a reasonable opportunity to comment  
26 on such undertakings. This includes identification (usually through archival  
27 research, field inventories, public interpretation, and/or test evaluations) of  
28 cultural resources eligible for the NRHP, assessment of adverse effects to  
29 eligible properties, and resolution of adverse effects. The revised regulations  
30 emphasize consultation with appropriate Native American communities (in the  
31 case of prehistoric, ethnographic, or Traditional Cultural Properties), and the  
32 preparation of Memoranda of Agreement (MOA) among involved agencies and  
33 parties.

34 Section 106 defines significant archaeological or historical resources as those  
35 which are listed on, or eligible for listing on, the National Register. Eligible  
36 properties are those that retain sufficient integrity and meet one or more of the  
37 following criteria: “(a)...are associated with events that have made a significant  
38 contribution to the broad patterns of our history; or (b) that are associated with  
39 the lives of persons significant in our past; or (c) that embody the distinctive  
40 characteristics of a type, period, or method of construction, or that represent a  
41 significant and distinguishable entity whose components may lack individual

1 distinction; or (d) that have yielded, or may be likely to yield, information  
2 important in prehistory or history” (36 Code of Federal Regulations (CFR)  
3 60.4).

4 The Native American Graves Protection and Repatriation Act (Public Law 101-  
5 601; 25 United States Code 3001-3013) pertains to Native American burial sites  
6 and regulates the removal of human remains, funerary objects, sacred objects,  
7 and items of cultural patrimony on Federal and tribal lands. The Act ensures  
8 that permits are obtained for archaeological excavation on Federal lands, covers  
9 cases of inadvertent discoveries, and dictates the ultimate disposition of any  
10 human remains and associated funerary objects. The act also outlines criminal  
11 penalties for failure to comply.

12 The American Indian Religious Freedom Act (42 United States Code Section  
13 1996) states that it is the policy of the United States to “protect and preserve for  
14 American Indians their inherent right of freedom to exercise the traditional  
15 religions of the American Indian, Eskimo, Aleut, and Native Hawaiians,  
16 including but not limited to access to sites, use and possession of sacred objects,  
17 and the freedom to worship through ceremonials and traditional rites.” The  
18 provisions of American Indian Religious Freedom Act guarantee access to  
19 traditional sites on Federal lands and noninterference with religious practices.  
20 Consultation under American Indian Religious Freedom Act with American  
21 Indian groups can simultaneously satisfy the requirements of NEPA as well.

22 The purpose of the Archaeological Resources Protection Act of 1979 (ARPA)  
23 (Public Law 95-96 – October 31, 1979) is to protect archaeological resources  
24 and sites that are located on public lands and Indian lands, and to foster  
25 increased cooperation between governmental authorities, the professional  
26 archaeological community, and private individuals in possession of  
27 archaeological resources. The act makes it unlawful to excavate, remove or  
28 deface archaeological resources, to sell, purchase, or exchange those resources  
29 without applicable permit, and establishes criminal and civil penalties for any  
30 such violation.

#### 31 **14.2.2 State**

32 Under CEQA, the lead non-Federal agency (state, county, city, or other) must  
33 consider potential effects to important or unique cultural resources. While the  
34 language and consultation process is somewhat different between the NHPA  
35 and CEQA, the definitions of eligible properties and of adverse impacts are  
36 essentially the same. Evaluations under CEQA consider a resource’s potential  
37 eligibility to the California Register of Historical Resources.

38 California law also protects Native American burials, skeletal remains, and  
39 associated grave goods regardless of their antiquity, and provides for the  
40 sensitive treatment and disposition of those remains (California Health and  
41 Safety Code Section 7050.5, California Public Resources Code Sections  
42 5097.94 et seq.).

1 **14.2.3 Regulatory Compliance**

2 Currently, there is no undertaking authorized by Congress involving the raising  
3 of Shasta Dam. Federal agencies may conduct nondestructive planning activities  
4 without completing Section 106, provided that the actions do not prohibit  
5 subsequent consideration of alternatives to avoid, minimize, or mitigate the  
6 undertaking's adverse effects on historic properties. This environmental  
7 document is in support of a feasibility study. Should the undertaking be  
8 authorized, Section 106 would be initiated early in that planning process (36  
9 CFR Section 800. 1(c)).

10 Under Section 106, these efforts would include the following:

- 11 • A complete pedestrian survey and inventory of cultural resources  
12 within the area of potential effect (APE) of the selected alternative
- 13 • Ethnographic and ethnohistoric investigations to obtain greater detail  
14 regarding areas of importance to Native American tribes and groups
- 15 • Evaluations to determine whether cultural resources identified within  
16 the APE are eligible for inclusion in the NRHP
- 17 • Assessment of potential adverse effects to historic properties and  
18 consultation to resolve any identified adverse effects

19 Cultural resources are evaluated for inclusion in the NRHP based on criteria  
20 found at 36 CFR Part 60. Once a resource has been evaluated, the lead Federal  
21 agency determines eligibility in consultation with the SHPO and other  
22 consulting parties, as applicable. Where appropriate this process will include  
23 the USFS in the consultation to ensure appropriate consideration is given to the  
24 Shasta-Trinity National Forest Land and Resource Management Plan (STNF  
25 LRMP). The overall project actions, as authorized by Congress, may not be  
26 consistent with the STNF LRMP standards and guidelines (USFS 1995). A  
27 project specific STNF LRMP amendment may be required for the standards  
28 associated with caves, visual quality, late successional reserves, riparian  
29 reserves, survey and manage species, and Shasta snow-wreath. The USFS  
30 decision would include a project specific exception to these standards.

31 In this process, previous determinations of eligibility may need to be  
32 reevaluated because of the passage of time or other factors, and it is important  
33 to acknowledge the special expertise of Indian tribes when assessing the  
34 eligibility of properties to which they attach ceremonial and cultural  
35 significance. It would be possible to evaluate some cultural resources with  
36 survey-level data. However, test excavations may be necessary to accurately  
37 evaluate many archaeological resources to determine if they are, in fact, historic  
38 properties.

1 The lead Federal agency is required to consider the effects of any potential  
2 project on historic properties within the APE. The criteria for assessing adverse  
3 effects are found in 36 CFR Part 800.5(a)(1), which states that “an adverse  
4 effect is found when an undertaking may alter, directly or indirectly, any  
5 characteristic of a historic property that qualify the property for inclusion in the  
6 National Register...” Examples of adverse effects include physical destruction,  
7 alteration, a change in the property’s setting, or the introduction of visual,  
8 atmospheric, or audible elements that diminish the integrity of the property’s  
9 significant historic features (36 CFR Part 800.5(a)(2)).

10 As part of the Section 106 process, the lead Federal agency is responsible for  
11 making a finding regarding whether the undertaking would have an adverse  
12 effect on historic properties. This assessment of adverse effects is made in  
13 consultation with SHPO and Indian tribes that attach religious and cultural  
14 significance to identified historic properties. Reclamation would then seek  
15 concurrence from SHPO on the finding of effect.

16 Consultation then continues among Reclamation, USFS, other applicable  
17 Federal agencies; SHPO; and other consulting parties on possible options for  
18 avoiding, minimizing, or mitigating the adverse effects. This includes notifying  
19 the Council when adverse effects are found and inviting the Council to  
20 participate. If SHPO, Reclamation, USFS, other applicable Federal agencies,  
21 and the Council (if participating) agree to measures to resolve adverse effects to  
22 historic properties, these are formalized in an MOA. Other consulting parties  
23 may be invited to sign the MOA. The Section 106 process (36 CFR Part 800.14)  
24 is completed once the terms of the MOA have been met. Alternatively, the  
25 Federal agencies may elect to enter into a programmatic agreement (PA) that  
26 would be developed as an alternative procedure to implement the Section 106  
27 process (36 CFR Part 800.14). In rare cases, if consultation fails to result in  
28 agreement on resolving adverse effects, consultation may be terminated  
29 pursuant to the process detailed in 36 CFR Part 800.7.

### 30 **14.3 Environmental Consequences and Mitigation Measures**

31 This chapter is organized by the project alternatives described in Chapter 2,  
32 “Alternatives,” and discusses environmental consequences associated with  
33 implementation of the project alternatives. It also describes potential mitigation  
34 measures associated with impacts to cultural resources that are significant or  
35 potentially significant.

36 The environmental setting for this chapter includes only the primary study area,  
37 Shasta Lake and vicinity, and the upper Sacramento River between Keswick  
38 and the Red Bluff Pumping Plant, as explained in Section 14.1. No potential  
39 impacts are expected in the extended study area; therefore, only impacts to  
40 cultural resources in the primary study area will be discussed. The extended  
41 study area is not discussed further in this section.

### 14.3.1 Impact Assessment Methods and Assumptions

The standard Section 106 process of the NHPA follows a series of steps that are described in the 36 CFR Part 800 regulations that implement the NHPA. These steps are as follows:

- Initiate Section 106 Process, 36 CFR Part 800.3
- Identify Historic Properties, 36 CFR Part 800.4
- Assess Adverse Effects, 36 CFR Part 800.5
- Resolve Adverse Effects, 36 CFR Part 800.6

“Adverse effects” are defined below in Section 14.3.2. In the event that historic properties within the APE for an undertaking would be subject to adverse effects, the lead Federal agency would consider ways to minimize or mitigate (“resolve”) such effects, in consultation with the SHPO and other signatories and consulting parties. This often requires an MOA or PA among the consulting parties (Part 800.6).

Section 106 regulations allow Federal agencies to conduct “nondestructive project planning activities before completing compliance with Section 106” (36 CFR Part 800.1[c]), and the regulations encourage Federal agencies to consider a broad range of alternatives during the planning process for the undertaking. The SLWRI feasibility-level study is such a “nondestructive project planning” document, as there is no authorization for raising Shasta Dam at this time. Reclamation will not have a specific undertaking until such time as Congress makes a decision regarding whether to authorize a project that would involve raising the dam and appropriates funding for this purpose.

The purpose of this feasibility study has been to gather existing data that can be used in future environmental documents to estimate the impacts to the types of historic properties known to be present, based on existing data and consultations.

As part of compliance with 36 CFR Part 800 regulations, Reclamation conducted an analysis of the APE to assess, which portions of the APE have been previously inventoried, and to identify all previously recorded cultural resources. Methods used for the cultural resources analysis included archival records searches (that identified previously records sites, site records and Native American ethnographic studies), agency consultation, Native American consultations, and comparisons of the study alternatives. Information on archaeological and historical structures was obtained for sites within the primary study area that may be affected by alternative plans. Sensitivity analyses were also conducted for prehistoric and historic-era resources to address data gaps using methods tailored to each data set. Native American

1 issues and resource locations within the primary study area were discussed  
2 during meetings with local Native American groups and individuals.

3 Also included in the analysis was an assessment of the effects of inundation and  
4 drawdown on cultural resources located within the pool of a reservoir. Previous  
5 reservoir studies have shown that the greatest impacts occur in the zone of  
6 inundation and drawdown (fluctuation zone), where cultural resources are  
7 repeatedly exposed to scouring, wave action, wet/dry cycles, and de-vegetation.  
8 This means that the most significant impacts will occur where an undertaking  
9 increases the size of the fluctuation zone—particularly if it includes areas that are  
10 above the current high-water line and thus have not previously been subject to  
11 inundation.

### 12 ***Archaeological and Historic-Era Structural Resources***

13 The prior cultural resources inventory efforts and the resulting recorded cultural  
14 resources had been previously discussed in Section 14.1.2. Overall, the  
15 frequency and distribution of recorded sites within the project study area only  
16 give a limited and incomplete picture of the actual number of resources. This is  
17 because only a very small percentage of the project area has been systematically  
18 inventoried for cultural resources. To estimate site densities for the project area  
19 as a whole, sensitivity analysis was undertaken. Separate sensitivity analyses for  
20 prehistoric and historic-era sites were conducted to predict where unrecorded  
21 sites should be concentrated within unsurveyed areas. The resulting site-density  
22 predictions provide the most accurate estimate of site sensitivity by alternative  
23 available at present. The following discussion presents the methods and  
24 approach taken.

25 The archival research done for this study was designed to identify the types of  
26 cultural resources known to be present in the study area. However, the  
27 frequency and distribution of formally recorded resources give only a limited  
28 and incomplete picture of the actual number of resources. This is mainly due to  
29 limited systematic surveys comprising only 5 percent of the Shasta study area  
30 and 15 percent of the upper Sacramento River. As such, there are undoubtedly  
31 many more cultural resources that have not been identified or formally  
32 recorded.

33 A comparative sensitivity analysis was therefore conducted that took into  
34 account both documented and likely but undocumented resources (including  
35 archaeological sites and historic-era structures) for each of the alternatives  
36 proposed for raising Shasta Dam. The sensitivity analysis was restricted to the  
37 Shasta Lake and vicinity, and did not include the upper Sacramento River since  
38 no impact differences between alternatives have been identified within this area.

39 Separate sensitivity analyses using methods tailored to each data set were  
40 conducted for prehistoric and historic-era sites to estimate the total number of  
41 cultural resources present within each alternative (see Byrd et al. (2008) for  
42 methodological details and specific data). The prehistoric sensitivity analysis



1 used a weights-of-evidence quantitative analysis to predict the overall density  
2 and distribution of sites. In contrast, the historic-era sensitivity study gathered  
3 archival data (mainly maps) within the study area to make predictions regarding  
4 the number and type of potential unrecorded historic-era resources (both  
5 structures and sites) by alternative. Results of the prehistoric and historic-era  
6 sensitivity analyses were integrated to provide quantitative estimates of the total  
7 number of cultural resources after full inventory. These estimates are for  
8 planning purposes only; additional pedestrian surveys would be needed if one of  
9 the affirmative alternatives were to go forward.

10 A second records search was completed to identify recorded cultural resources  
11 in specific areas of the upper Sacramento River where construction activities  
12 would take place in certain alternatives associated with ecosystem restoration,  
13 including spawning gravel augmentation and floodplain and riparian habitat  
14 restoration. For these construction areas, existing access roads were excluded,  
15 but a records search buffer of 0.25 mile was added to all other project elements.  
16 It should be noted that the proposed construction areas are concept-level, and  
17 may be relocated or deleted as a result of design development, consultation, or  
18 other factors.

### 19 ***Traditional Cultural Properties***

20 Public and stakeholder coordination meetings were conducted on behalf of  
21 Reclamation with Native American tribal groups whose traditional territories  
22 overlap the study area to identify Traditional Cultural Properties, ceremonial  
23 locations, and other areas of concern to the Native American community. This  
24 included meetings and/or workshops with groups and individuals representing  
25 major tribes and/or extended family groups in the Shasta/Redding area  
26 regarding potential effects to cultural resources from a plan to enlarge Shasta  
27 Dam and Reservoir. The primary intent of these meetings was to strengthen  
28 communication with tribal groups and individuals; solicit, clarify, and document  
29 major concerns and issues; and establish a preferred method/ approach to  
30 maintaining effective communication during the remainder of the SLWRI and  
31 in future endeavors.

32 Federally recognized Native American tribes were invited to begin the  
33 consultation process at an information meeting, followed by additional contact  
34 by telephone to learn of their concerns regarding the SLWRI, and to gain an  
35 initial sense of where sensitive resource localities are situated within the  
36 primary study area. Non-Federally recognized Native American groups and  
37 individuals with an interest in the study area were also contacted. There were  
38 also in-person visits to tribal members to collect information.

39 Seven tribal groups were invited to an information meeting held on April 4,  
40 2007, in Redding, California. The purpose of the meeting was to provide  
41 general information about the SLWRI, initiate Section 106 consultation with  
42 groups desiring to participate in the project, and introduce Elena Nilsson, a

1 consultant for Reclamation, as the Native American Tribal Coordination study  
2 lead. Invitations were sent to the groups shown in Table 14-1.

3 **Table 14-1. Native American Groups Involved in Consultations**

Native American Group
Grindstone Indian Rancheria of Wintun-Wailaki Indians <sup>1</sup>
Paskenta Band of Nomlaki Indians <sup>1</sup>
Pit River Tribe <sup>1</sup>
Redding Rancheria <sup>1</sup>
Shasta Nation
Winnemem Wintu
Wintu Tribe/Toyon-Wintu Center

Note:

<sup>1</sup> Federally recognized tribe as of 2012 (<http://www.bia.gov/cs/groups/public/documents/text/idc-041248.pdf>)

4 From August 2007 to March 2008, nine meetings were held with Native  
5 American groups whose traditional territories overlap with the SLWRI study  
6 area. The purpose of the meetings was to solicit, clarify, and document major  
7 concerns and issues regarding the project, and to establish a preferred  
8 method/approach to maintaining effective communication during the remainder  
9 of the SLWRI study and in future endeavors. Five groups participated in these  
10 meetings, including the Grindstone Indian Rancheria (one meeting), Paskenta  
11 Band of Nomlaki Indians (one meeting), Pit River Tribe (three meetings),  
12 Shasta Nation (one meeting), and Winnemem Wintu (three meetings).

13 Currently, no formal Traditional Cultural Properties (as defined by Federal  
14 regulations) are formally recorded at the Information Center. The California  
15 Native American Heritage Commission, however, has stated that sacred lands  
16 (as defined by this commission) are present in the study area. No additional  
17 investigations have been undertaken to identify and formally document  
18 Traditional Cultural Properties, in large part because Native American groups  
19 are unwilling to provide sufficiently detailed information at this stage in the  
20 study. Based on initial statements provided by Native Americans and previous  
21 ethnographic and ethnohistoric studies, it is predicted that a considerable  
22 number of Traditional Cultural Properties and other areas of special concern are  
23 present in the study area.

### 24 **14.3.2 Criteria for Determining Significance of Effects**

25 An environmental document prepared to comply with NEPA must consider the  
26 context and intensity of the environmental effects that would be caused by, or  
27 result from, the proposed action. Under NEPA, the significance of an effect is  
28 used to determine whether an Environmental Impact Statement must be  
29 prepared. An environmental document prepared to comply with CEQA must  
30 identify the potentially significant environmental effects of a proposed project.  
31 A “[s]ignificant effect on the environment” means a substantial, or potentially  
32 substantial, adverse change in any of the physical conditions within the area

1 affected by the project (State CEQA Guidelines, Section 15382). CEQA also  
2 requires that the environmental document propose feasible measures to avoid or  
3 substantially reduce significant environmental effects (State and CEQA  
4 Guidelines, Section 15126.4(a).

5 **Federal Criteria**

6 Under Federal regulation (36 CFR Section 800(a)(1)):

7 *“An adverse effect is found when an undertaking may alter,*  
8 *directly or indirectly, any of the characteristics of a historic*  
9 *property that qualify the property for inclusion in the National*  
10 *Register in a manner that would diminish the integrity of the*  
11 *property's location, design, setting, materials, workmanship,*  
12 *feeling, or association. Consideration shall be given to all*  
13 *qualifying characteristics of a historic property, including those*  
14 *that may have been identified subsequent to the original*  
15 *evaluation of the property's eligibility for the National Register.*  
16 *Adverse effects may include reasonably foreseeable effects*  
17 *caused by the undertaking that may occur later in time, be*  
18 *farther removed in distance or be cumulative.”*

19 Examples of adverse effects (36 CFR Section 800(a)(2)) include the following:

- 20 • Physical destruction, damage, or alteration, including moving the  
21 property from its historic location
- 22 • Isolation from, or alteration of, the setting
- 23 • Introduction of intrusive elements
- 24 • Neglect leading to deterioration or destruction
- 25 • Transfer, sale, or lease from Federal ownership

26 Adverse effects often can be resolved or mitigated through additional research,  
27 public education, and/or other means.

28 **State Criteria**

29 California regulations require that effects to cultural resources be considered  
30 only for resources meeting the criteria for eligibility to the California Register  
31 of Historical Resources, outlined in Section 5024.1 of the California Public  
32 Resources Code. Demolition, replacement, substantial alteration, or relocation  
33 of an eligible resource are actions that could change those elements of the  
34 resource which make it eligible. The following eligibility criteria were  
35 developed using guidance provided by the State CEQA Guidelines, and they  
36 consider the context and intensity of the environmental effects as required under  
37 NEPA. Under the State CEQA Guidelines, impacts on cultural resources may

1 be considered significant if a project alternative would result in any of the  
2 following:

- 3 • Cause a substantial adverse change in the significance of a historical  
4 resource, as defined in Guidelines Section 15064.5
- 5 • Cause a substantial adverse change in the significance of an  
6 archaeological resource pursuant to Guidelines Section 15064.5
- 7 • Disturb human remains, including those interred outside formal  
8 cemeteries

9 According to the above criteria, the project would be considered to have a  
10 significant impact on cultural resources if it would result in any of the  
11 following:

- 12 • Substantial adverse change in the significance of an historical resource
- 13 • Substantial adverse change in the significance of a unique  
14 archaeological resource
- 15 • Disturbance or destruction of unique paleontological resource or site or  
16 unique geologic feature
- 17 • Disturbance of any human remains, including those interred outside of  
18 formal cemeteries
- 19 • Elimination of important examples of the major periods of California  
20 history or prehistory

21 Under CEQA an impact to a cultural resource can be reduced to a less-than-  
22 significant level through mitigation. Statements of impact significance are  
23 relative to both existing conditions (Year 2012) and future conditions (Year  
24 2030), unless stated otherwise. Only those elements of a resource which  
25 contribute to its eligibility need to be considered; effects to noncontributing  
26 elements are less than significant.

### 27 **14.3.3 Direct and Indirect Effects**

28 This section describes the environmental consequences of the SLWRI  
29 alternatives, and proposed mitigation measures for any impacts determined to  
30 be significant or potentially significant.

#### 31 ***No-Action Alternative***

32 Dam construction, infrastructure and facilities relocation, additional reservoir  
33 area inundation, and construction activities adjacent to the upper Sacramento  
34 River would not occur under the No-Action Alternative. Therefore, no

1 additional historic properties above the current reservoir level would be  
2 impacted, and conditions would be the same as existing.

### 3 **Shasta Lake and Vicinity**

4 *Impact Culture-1 (No-Action): Disturbance or Destruction of Archaeological*  
5 *and Historical Resources Due to Construction or Inundation* Archaeological  
6 sites (as well as historic cemetery locations) within the existing Shasta Lake  
7 fluctuation zone will continue to be impacted by fluctuations in the height of the  
8 reservoir during ongoing operations with the No-Action Alternative. As stated  
9 above, dam construction, infrastructure and facilities relocation, and additional  
10 reservoir area inundation would not occur under the No-Action Alternative;  
11 therefore, no new impacts on cultural resources related to construction or  
12 inundation are expected. There may be ongoing impacts to cultural resources,  
13 but there is no responsibility to mitigate them. Mitigation is not required for the  
14 No-Action Alternative.

15 *Impact Culture-2 (No-Action): Inundation of Traditional Cultural Properties*  
16 Any Traditional Cultural Properties within the existing Shasta Lake fluctuation  
17 zone will continue to be impacted by fluctuations in the height of the reservoir  
18 during ongoing operations with the No-Action Alternative. As stated above,  
19 additional reservoir area inundation would not occur under the No-Action  
20 Alternative; therefore, no new impacts on cultural resources related to  
21 inundation are expected. There may be ongoing impacts to Traditional Cultural  
22 Properties, but there is no responsibility to mitigate them. Mitigation is not  
23 required for the No-Action Alternative.

### 24 **Upper Sacramento River (Shasta Dam to Red Bluff)**

25 *Impact Culture-3 (No-Action): Disturbance or Destruction of Archaeological*  
26 *and Historical Resources near the Upper Sacramento River Due to*  
27 *Construction* Archaeological sites (as well as historic cemetery locations) in or  
28 near the upper Sacramento River will continue to be impacted by water  
29 operations with the No-Action Alternative. As stated above, construction  
30 activities adjacent to the upper Sacramento River would not occur under the No-  
31 Action Alternative; therefore, no impacts on cultural resources related to  
32 construction are expected. Mitigation is not required for the No-Action  
33 Alternative.

### 34 **CP1 – 6.5-Foot Dam Raise, Anadromous Fish Survival and Water Supply** 35 **Reliability**

36 Cultural resources potentially impacted by this alternative include those within:  
37 (1) the proposed additional 1,229-acre inundation area; (2) the portion of the  
38 proposed fluctuation zone for this alternative within the existing reservoir area;  
39 and (3) those portions of the 0.25-mile buffer around the reservoir where  
40 infrastructure would need to be relocated (recreation facilities, roads, utilities,  
41 trails, etc.). It should be noted that sites typically extend into the inundation and  
42 reservoir area for more than one alternative.

**Shasta Lake and Vicinity**

*Impact Culture-I (CP1): Disturbance or Destruction of Archaeological and Historical Resources Due to Construction or Inundation* Raising Shasta Dam would have a direct impact on cultural resources. This impact would be significant. As noted, previous reservoir studies indicate that impacts are greatest in the zone of inundation and drawdown (fluctuation zone), where cultural resources are repeatedly exposed to scouring, wave action, wet/dry cycles, and de-vegetation. This means that the most significant impacts will occur where an undertaking increases the size of the fluctuation zone.

Sensitivity studies estimate that, with complete surveys, impacts associated with CP1 inundation and areas would include approximately 212±54 prehistoric resources (Table 14-2). The historic-era archival study documented 355 localities that may potentially contain historic-era remains within this inundation area.

Sensitivity studies estimate that, with complete surveys, the CP1 fluctuation zone would include approximately 675±172 prehistoric resources. The historic-era archival study documented 529 localities that may potentially contain historic-era remains.

**Table 14-2. Cultural Resources Impacts for CP1**

<b>Inundation Area</b>	
Prehistoric sites	212±54
Historic-era archival localities	355
<b>Fluctuation Zone</b>	
Prehistoric sites	675±172
Historic-era archival localities	529
<b>0.25-Mile Buffer</b>	
All cultural resources	Fewer than CP2

Notes:

Mean prehistoric site estimates are based on weights-of-evidence quantitative analysis.  
 An undetermined number of sites will actually be subject to mitigation under NHPA Section 106.

Sensitivity studies estimate that with complete surveys, the ¼-mile buffer area for CP1 would include approximately 728±212 prehistoric resources. The historic-era archival study documented 773 localities that may potentially contain historic-era remains. Although the full extent and locations of project impacts within the buffer zone related to construction are not yet available for CP1, impacts would occur within only a small percentage of the overall buffer zone concentrated near the reservoir.

Although it is impossible at this stage to say how many of these resources will be determined eligible for listing under NHPA, and how many of the eligible resources will sustain adverse impacts from this alternative, this impact would be significant. Adverse effects will be avoided, minimized, or mitigated through project redesign, when warranted, or through the development and

1 implementation of an MOA or programmatic agreement (PA), as discussed in  
2 Section 14.3.1.

3 *Impact Culture-2 (CP1): Inundation of Traditional Cultural Properties and*  
4 *Sacred Land Filings* Due to the confidential nature of sacred land filings, some  
5 sites have been identified within the study area, but specific locations are  
6 unknown. Several tribal groups have identified Traditional Cultural Properties  
7 and important ceremonial locations that would be adversely impacted by CP1.  
8 This impact would be significant.

9 In addition, places used for traditional practices that may be Traditional Cultural  
10 Properties have been identified within the study area. These locations are also  
11 confidential.

12 Two particularly important Winnemem Wintu ceremonial locations that would  
13 be impacted by CP1 include Puberty Rock and the doctoring pools near  
14 Nawtawaket Creek. CP1 could increase the frequency of inundation of Puberty  
15 Rock, restricting the Winnemem Wintu from holding the puberty ceremony at  
16 this important location during certain periods. Although Puberty Rock would  
17 still be accessible for portions of the year, when lake levels are lower, CP1  
18 would increase the frequency of inundation. The relocation of the rock to  
19 higher ground is not possible, as, in the Winnemem worldview, its location is  
20 preordained and connected with the nearby “two sisters” mountain (Bollibokka  
21 Mountain). Puberty Rock also marks the location of an extensive village with  
22 housepits and burials. CP1 would inundate additional burials at this location,  
23 which would require removal and relocation. The Winnemem Wintu have  
24 estimated that 120 ancestral villages still accessible above the current high  
25 waterline of Shasta Lake would be adversely impacted by CP1.

26 The Pit River Madesi Band members state that 22 ethnographic villages,  
27 associated burial grounds, and several Traditional Cultural Properties are  
28 located within the existing reservoir and proposed inundation or fluctuation  
29 areas.

30 The local Native American community has identified several locations in the  
31 study area where ceremonial activities are carried out; notable among these are  
32 Puberty Rock and the doctoring pools near Nawtawaket Creek. Inundation or  
33 other adverse impacts to these places likely cannot be mitigated because the  
34 importance of the identified properties is inextricably tied to physical location,  
35 and relocation of these features away from the inundation area is not possible.

36 Although it is impossible at this stage to say how many of these resources will  
37 be adversely impacted due to inundation as a result of implementing CP1, this  
38 impact would be significant. Mitigation for this impact is not available.  
39 Mitigation for this impact is not proposed in Section 14.3.1 because no feasible  
40 mitigation is available to reduce the impact to a less-than-significant level.

**Upper Sacramento River (Shasta Dam to Red Bluff)**

*Impact Culture-3 (CP1): Disturbance or Destruction of Archaeological and Historical Resources near the Upper Sacramento River Due to Construction*

Construction activities adjacent to the upper Sacramento River associated with downstream ecosystem enhancements would not occur under CP1; therefore, no impacts on significant cultural resources related to construction are expected. Mitigation for this impact is not needed, and thus not proposed.

**CP2 – 12.5-Foot Dam Raise, Anadromous Fish Survival and Water Supply Reliability**

Cultural resources potentially impacted by this alternative include those within (1) the proposed additional 1,734-acre inundation area, (2) the portion of the proposed fluctuation zone for this alternative within the existing reservoir area, and (3) those portions of the 0.25-mile buffer around the reservoir where infrastructure would need to be relocated (recreation facilities, roads, utilities, trails, etc.).

**Shasta Lake and Vicinity**

*Impact Culture-1 (CP2): Disturbance or Destruction of Archaeological and Historical Resources Due to Construction or Inundation* Raising Shasta Dam would have a direct impact on cultural resources. This impact would be significant. Sensitivity studies estimate that, with complete surveys, inundation associated with CP2 would include approximately 224±57 prehistoric resources (Table 14-3). The historic-era archival study documented 371 localities that may potentially contain historic-era remains within this inundation area.

**Table 14-3. Cultural Resources Impacts for CP2**

<b>Inundation Area</b>	
Prehistoric sites	224±57
Historic-era archival localities	371
<b>Fluctuation Zone</b>	
Prehistoric sites	675±172
Historic-era archival localities	529
<b>0.25-Mile Buffer</b>	
All cultural resources	Fewer than CP3

Notes:

Mean prehistoric site estimates are based on weights-of-evidence quantitative analysis.  
 An undetermined number of sites will actually be subject to mitigation under NHPA Sec. 106.

Sensitivity studies estimate that, with complete surveys, the fluctuation zone for CP2 would include approximately 675±172 prehistoric resources. The historic-era archival study documented 529 localities that may potentially contain historic-era remains.

Sensitivity studies estimate that, with complete surveys, the 0.25-mile buffer zone for CP2 would include approximately 728±212 prehistoric resources. The historic-era archival study documented 773 localities that may potentially



1 contain historic-era remains. Although the full extent and locations of project  
2 impacts related to construction activities within the buffer zone are not yet  
3 available for this alternative, they would occur within only a small percentage  
4 of the overall buffer zone concentrated near the reservoir.

5 Although it is impossible at this stage to say how many of these resources will  
6 be determined eligible, and how many of the eligible resources will sustain  
7 adverse impacts from CP2, this impact would be significant. Inundation or other  
8 adverse impacts to affected resources likely cannot be mitigated because the  
9 importance of the identified properties and ceremonial locations is inextricably  
10 tied to physical location, and relocation of these features away from the  
11 inundation area is not possible. Adverse effects will be resolved through project  
12 redesign when warranted or through the development of an MOA or PA, as  
13 discussed in Section 14.3.1.

14 *Impact Culture-2 (CP2): Inundation of Traditional Cultural Properties*

15 Alternative CP2 is similar to Alternative CP1 with respect to its potential to  
16 cause or be affected by inundation. The NAHC identified sacred land filings  
17 within the study area. These locations are confidential, thus making it unclear  
18 whether or not they are situated within the CP2 area. For the same reasons that  
19 apply to CP1, this impact would be significant. Mitigation for this impact is not  
20 proposed in Section 14.3.1 because no feasible mitigation is available to reduce  
21 the impact to a less-than-significant level.

22 **Upper Sacramento River (Shasta Dam to Red Bluff)**

23 *Impact Culture-3 (CP2): Disturbance or Destruction of Archaeological and*  
24 *Historical Resources near the Upper Sacramento River Due to Construction*

25 Construction activities adjacent to the upper Sacramento River associated with  
26 downstream ecosystem enhancements would not occur under CP2; therefore, no  
27 impacts on cultural resources related to construction are expected. Mitigation  
28 for this impact is not needed, and thus not proposed.

29 **CP3 – 18.5-Foot Dam Raise, Anadromous Fish Survival and Agricultural**  
30 **Water Supply Reliability**

31 Cultural resources potentially impacted by this alternative include those within  
32 (1) the proposed additional 2,497-acre inundation area, (2) the portion of the  
33 proposed fluctuation zone for this alternative within the existing reservoir area,  
34 and (3) those portions of the 0.25-mile buffer around the reservoir where  
35 infrastructure would need to be relocated (recreation facilities, roads, utilities,  
36 trails, etc.).

37 **Shasta Lake and Vicinity**

38 *Impact Culture-1 (CP3): Disturbance or Destruction of Archaeological and*  
39 *Historical Resources Due to Construction or Inundation* Raising Shasta Dam

40 would have a direct impact on cultural resources. This impact would be  
41 significant. Sensitivity studies estimate that, with complete surveys, inundation  
42 associated with CP3 would include approximately 243±63 prehistoric resources

1 (Table 14-4). The historic-era archival study documented 391 localities that  
 2 may potentially contain historic-era remains within this inundation area.

3 **Table 14-4. Cultural Resources Impacts for CP3**

<b>Inundation Area</b>	
Prehistoric sites	243±63
Historic-era archival localities	391
<b>Fluctuation Zone</b>	
Prehistoric sites	675±172
Historic-era archival localities	529
<b>0.25-Mile Buffer</b>	
All cultural resources	Fewer than CP5, same as CP4

Notes:

Mean prehistoric site estimates are based on weights-of-evidence quantitative analysis.

An undetermined number of sites will actually be subject to mitigation under NHPA Sec. 106.

4 Sensitivity studies estimate that, with complete surveys, the fluctuation zone for  
 5 CP3 would include approximately 675±172 prehistoric resources. The historic-  
 6 era archival study documented 529 localities that may potentially contain  
 7 historic-era remains.

8 Sensitivity studies estimate that, with complete surveys, the 0.25-mile buffer  
 9 zone for CP3 would include approximately 728±212 prehistoric resources. The  
 10 historic-era archival study documented 773 localities that may contain historic-  
 11 era remains. Although the full extent and locations of project impacts related to  
 12 construction activities within the buffer zone are not yet available for this  
 13 alternative, they would occur within only a small percentage of the overall  
 14 buffer zone concentrated near the reservoir.

15 Although it is impossible at this stage to say how many of these resources will  
 16 be determined eligible, and how many of the eligible resources will sustain  
 17 adverse impacts from CP3, this impact would be significant. Inundation or other  
 18 adverse impacts to affected resources likely cannot be mitigated because the  
 19 importance of the identified properties and ceremonial locations is inextricably  
 20 tied to physical location, and relocation of these features away from the  
 21 inundation area is not possible. Adverse effects will be resolved through project  
 22 redesign when warranted or through the development of an MOA or PA, as  
 23 discussed in Section 14.3.1.

24 *Impact Culture-2 (CP3): Inundation of Traditional Cultural Properties*

25 Alternative CP3 is similar to Alternative CP1 with respect to its potential to  
 26 cause or be affected by inundation. The NAHC identified sacred land filings  
 27 within the study area. These locations are confidential, thus making it unclear  
 28 whether or not they are situated within the CP3 area. For the same reasons that  
 29 apply to CP1, this impact would be significant. Mitigation for this impact is not

1 proposed in Section 14.3.1 because no feasible mitigation is available to reduce  
2 the impact to a less-than-significant level.

3 Mitigation for this impact is not available.

4 **Upper Sacramento River (Shasta Dam to Red Bluff)**

5 *Impact Culture-3 (CP3): Disturbance or Destruction of Archaeological and*  
6 *Historical Resources near the Upper Sacramento River Due to Construction*  
7 Construction activities adjacent to the upper Sacramento River associated with  
8 downstream ecosystem enhancements would not occur under CP3; therefore, no  
9 impacts on cultural resources related to construction are expected. Mitigation  
10 for this impact is not needed, and thus not proposed.

11 **CP4 – 18.5-Foot Dam Raise, Anadromous Fish Focus With Water Supply**  
12 **Reliability**

13 Cultural resources potentially impacted by this alternative include those within  
14 (1) the proposed additional 2,497-acre inundation area, (2) the portion of the  
15 proposed fluctuation zone for this alternative within the existing reservoir area,  
16 and (3) those portions of the 0.25-mile buffer around the reservoir where  
17 infrastructure would need to be relocated (recreation facilities, roads, utilities,  
18 trails, etc.). CP4 also includes downstream ecosystem enhancements with  
19 spawning gravel augmentation and floodplain and riparian habitat restoration,  
20 both of which would entail construction activities adjacent to the upper  
21 Sacramento River.

22 **Shasta Lake and Vicinity**

23 *Impact Culture-1 (CP4): Disturbance or Destruction of Archaeological and*  
24 *Historical Resources Due to Construction or Inundation* Raising Shasta Dam  
25 would have a direct impact on cultural resources. This impact would be  
26 significant. Sensitivity studies estimate that with complete surveys, inundation  
27 associated with CP4 would include approximately 243±63 prehistoric resources  
28 (Table 14-5). The historic-era archival study documented 391 localities that  
29 may potentially contain historic-era remains within this inundation area.

30 **Table 14-5. Cultural Resources Impacts for CP4**

<b>Inundation Area</b>	
Prehistoric sites	243±63
Historic-era archival localities	391
<b>Fluctuation Zone</b>	
Prehistoric sites	601±154
Historic-era archival localities	524
<b>0.25-Mile Buffer</b>	
All cultural resources	Fewer than CP5, same as CP3

Notes:

Mean prehistoric site estimates are based on weights-of-evidence quantitative analysis.

An undetermined number of sites will actually be subject to mitigation under NHPA Sec. 106.

1 Sensitivity studies estimate that, with complete surveys, the fluctuation zone for  
2 CP4 would include approximately 601±154 prehistoric resources. The historic-  
3 era archival study documented 524 localities that may potentially contain  
4 historic-era remains.

5 Sensitivity studies estimate that, with complete surveys, the 0.25-mile buffer  
6 zone for CP4 would include approximately 728±212 prehistoric resources. The  
7 historic-era archival study documented 773 localities that may potentially  
8 contain historic-era remains. Although the full extent and locations of project  
9 impacts related to construction activities within the buffer zone are not yet  
10 available for this alternative, they would occur within only a small percentage  
11 of the overall buffer zone concentrated near the reservoir.

12 Although it is impossible at this stage to say how many of these resources will  
13 be determined eligible, and how many of the eligible resources will sustain  
14 adverse impacts from CP4, this impact would be significant. Inundation or other  
15 adverse impacts to affected resources likely cannot be mitigated because the  
16 importance of the identified properties and ceremonial locations is inextricably  
17 tied to physical location, and relocation of these features away from the  
18 inundation area is not possible. Adverse effects will be resolved through project  
19 redesign when warranted or through the development of an MOA or PA, as  
20 discussed in Section 14.3.1.

21 *Impact Culture-2 (CP4): Inundation of Traditional Cultural Properties*

22 Alternative CP4 is similar to Alternative CP1 with respect to its potential to  
23 cause or be affected by inundation. The NAHC identified sacred land filings  
24 within the study area. These locations are confidential, thus making it unclear  
25 whether or not they are situated within the CP4 area. For the same reasons that  
26 apply to CP1, this impact would be significant. Mitigation for this impact is not  
27 proposed in Section 14.3.1 because no feasible mitigation is available to reduce  
28 the impact to a less-than-significant level.

29 **Upper Sacramento River (Shasta Dam to Red Bluff)**

30 *Impact Culture-3 (CP4): Disturbance or Destruction of Archaeological and*  
31 *Historical Resources near the Upper Sacramento River Due to Construction*

32 This impact would be significant. Previous cultural resource studies indicated  
33 the presence of cultural resources in or near proposed downstream construction  
34 areas related to spawning gravel augmentation and floodplain and riparian  
35 habitat restoration.

36 A total of 17 cultural resources have been recorded within the records search  
37 areas, consisting of eight prehistoric sites, six historic-era resources, and three  
38 resources with prehistoric and historic-era components. As mapped, thirteen of  
39 these cultural resources exist only in the 1/8-mile buffer areas, and only four of  
40 these cultural resources extend into proposed construction areas. It should be  
41 noted that the proposed construction areas are concept-level and may be

1 relocated or deleted as a result of design development, consultation, or other  
2 factors.

3 Although it is impossible at this stage to say how many eligible resources will  
4 sustain adverse impacts from CP4, this impact would be significant. Adverse  
5 effects will be resolved through project redesign when warranted or through the  
6 development of an MOA or PA, as discussed in Section 14.3.1.

7 **CP5 – 18.5-Foot Dam Raise, Combination Plan**

8 Cultural resources potentially impacted by this alternative include those within  
9 (1) the proposed additional 2,497-acre inundation area, (2) the portion of the  
10 proposed fluctuation zone for this alternative within the existing reservoir area,  
11 and (3) those portions of the 0.25-mile buffer around the reservoir where  
12 infrastructure would need to be relocated (recreation facilities, roads, utilities,  
13 trails, etc.). CP5 also includes downstream ecosystem enhancements with  
14 spawning gravel augmentation and floodplain and riparian habitat restoration,  
15 both of which would entail construction activities adjacent to the upper  
16 Sacramento River.

17 **Shasta Lake and Vicinity**

18 *Impact Culture-1 (CP5): Disturbance or Destruction of Archaeological and*  
19 *Historical Resources Due to Construction or Inundation* Raising Shasta Dam  
20 would have a direct impact on cultural resources. This impact would be  
21 significant. Sensitivity studies estimate that, with complete surveys, inundation  
22 associated with CP5 would include approximately 243±63 prehistoric resources  
23 (Table 14-6). The historic-era archival study documented 391 localities that  
24 may potentially contain historic-era remains within this inundation area.

25 **Table 14-6. Cultural Resources Impacts for CP5**

<b>Inundation Area</b>	
Prehistoric sites	243±63
Historic-era archival localities	391
<b>Fluctuation Zone</b>	
Prehistoric sites	675±175
Historic-era archival localities	529
<b>0.25-Mile Buffer</b>	
All cultural resources	Largest quantity

Notes:

Mean prehistoric site estimates are based on weights-of-evidence quantitative analysis.

An undetermined number of sites will actually be subject to mitigation under NHPA Sec. 106.

26 Sensitivity studies estimate that, with complete surveys, the fluctuation zone for  
27 CP5 would include approximately 675±172 prehistoric resources. The historic-  
28 era archival study documented 529 localities that may potentially contain  
29 historic-era remains.

1 Sensitivity studies estimate that, with complete surveys, the 0.25-mile buffer  
2 zone for CP5 would include approximately 728±212 prehistoric resources. The  
3 historic-era archival study documented 773 localities that may potentially  
4 contain historic-era remains. Although the full extent and locations of project  
5 impacts related to construction activities within the buffer zone are not yet  
6 available for this alternative, they would occur within only a small percentage  
7 of the overall buffer zone concentrated near the reservoir.

8 Although it is impossible at this stage to say how many of these resources will  
9 be determined eligible, and how many of the eligible resources will sustain  
10 adverse impacts from CP5, this impact would be significant. Inundation or other  
11 adverse impacts to affected resources likely cannot be mitigated because the  
12 importance of the identified properties and ceremonial locations is inextricably  
13 tied to physical location, and relocation of these features away from the  
14 inundation area is not possible. Adverse effects will be resolved through project  
15 redesign when warranted or through the development of an MOA or PA, as  
16 discussed in Section 14.3.1.

17 *Impact Culture-2 (CP5): Inundation of Traditional Cultural Properties of*  
18 *Native American Concern* Alternative CP5 is similar to Alternative CP1 with  
19 respect to its potential to cause or be affected by inundation. The NAHC  
20 identified sacred land filings within the study area. These locations are  
21 confidential, thus making it unclear whether or not they are situated within the  
22 CP5 area. For the same reasons that apply to CP1, this impact would be  
23 significant. Mitigation for this impact is not proposed in Section 14.3.1 because  
24 no feasible mitigation is available to reduce the impact to a less-than-significant  
25 level.

### 26 **Upper Sacramento River (Shasta Dam to Red Bluff)**

27 *Impact Culture-3 (CP5): Disturbance or Destruction of Archaeological and*  
28 *Historical Resources near the Upper Sacramento River Due to Construction*  
29 This impact would be significant. Previous cultural resource studies indicated  
30 the presence of cultural resources in or near in proposed downstream  
31 construction areas related to spawning gravel augmentation and floodplain and  
32 riparian habitat restoration.

33 A total of 17 cultural resources have been recorded within the records search  
34 areas, consisting of eight prehistoric sites, six historic-era resources, and three  
35 resources with prehistoric and historic-era components. As mapped, thirteen of  
36 these cultural resources exist only in the 1/8-mile buffer areas, and only four of  
37 these cultural resources extend into proposed construction areas. It should be  
38 noted that the proposed construction areas are concept-level and may be  
39 relocated or deleted as a result of design development, consultation, or other  
40 factors.

41 Although it is impossible at this stage to say how many eligible resources will  
42 sustain adverse impacts from CP5, this impact would be significant. Adverse

1 effects will be resolved through project redesign when warranted or through the  
2 development of an MOA or PA, as discussed in Section 14.3.1.

3 **14.3.4 Mitigation Measures**

4 This section discusses mitigation measures for each significant impact described  
5 in the environmental consequences section, as presented in Table 14-7. In  
6 coordination with project designers, there will be opportunities to avoid,  
7 minimize, or mitigate adverse effects to historic properties through project  
8 redesign or through the development of an MOA or PA. An MOA or PA will  
9 ensure compliance with Section 106 and resolution of adverse effects.

10 **Table 14-7. Summary of Mitigation Measures for Cultural Resources**

Impact		No-Action Alternative	CP1	CP2	CP3	CP4	CP5
Impact Culture-1: Disturbance or Destruction of Archaeological and Historical Resources Due to Construction or Inundation	LOS before Mitigation	NI	S	S	S	S	S
	Mitigation Measure	None required.	Mitigation Measure Culture-1: Develop and Implement measures identified in an NHPA Section 106 MOA or PA				
	LOS after Mitigation	NI	LTS	LTS	LTS	LTS	LTS
Impact Culture-2: Inundation of Traditional Cultural Properties	LOS before Mitigation	NI	S	S	S	S	S
	Mitigation Measure	None required.	Adverse effects will be avoided, minimized, or mitigated through project redesign, when warranted, or through the development and implementation of an MOA or PA				
	LOS after Mitigation	NI	SU	SU	SU	SU	SU
Impact Culture-3: Disturbance or Destruction of Archaeological and Historical Resources near the Upper Sacramento River Due to Construction	LOS before Mitigation	NI	NI	NI	NI	S	S
	Mitigation Measure	None required.	No mitigation needed; thus, none proposed.			Mitigation Measure Culture-3: Implement Mitigation Measure Culture-1: Develop and Implement measures identified in an NHPA Section 106 MOA or PA	
	LOS after Mitigation	NI	NI	NI	NI	LTS	LTS

Key:  
LOS = level of significance  
LTS = less than significant  
MOA = Memorandum of Understanding  
NHPA = National Historic Preservation Act

NI = No Impact  
PA = Programmatic Agreement  
S = significant  
SU = significant and unavoidable

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**No-Action Alternative**

No mitigation measures are required for this alternative.

**CP1 – 6.5-Foot Dam Raise, Anadromous Fish Survival and Water Supply Reliability**

As this alternative is likely to cause significant, adverse impacts to historic properties, it will be necessary to mitigate those impacts.

**Mitigation Measure Culture-1 (CP1): Develop and Implement measures identified in an NHPA Section 106 MOA or PA** Avoid, minimize, or mitigate adverse effects through project redesign, when warranted, or through the development and implementation of an MOA or PA.

These impacts would be less than significant after mitigation.

**CP2 – 12.5-Foot Dam Raise, Anadromous Fish Survival and Water Supply Reliability**

As this alternative is likely to cause significant, adverse impacts to historic properties, it will be necessary to mitigate those impacts.

**Mitigation Measure Culture-1 (CP2): Develop and Implement measures identified in an NHPA Section 106 MOA or PA** Avoid, minimize, or mitigate adverse effects through project redesign, when warranted, or through the development and implementation of an MOA or PA.

These impacts would be less than significant after mitigation.

**CP3 – 18.5-Foot Dam Raise, Anadromous Fish Survival and Agricultural Water Supply Reliability**

As this alternative is likely to cause significant, adverse impacts to historic properties, it will be necessary to mitigate those impacts.

**Mitigation Measure Culture-1 (CP3): Develop and Implement measures identified in an NHPA Section 106 MOA or PA** Avoid, minimize, or mitigate adverse effects through project redesign, when warranted, or through the development and implementation of an MOA or PA.

These impacts would be less than significant after mitigation.

**CP4 – 18.5-Foot Dam Raise, Anadromous Fish Focus With Water Supply Reliability**

As this alternative is likely to cause significant, adverse impacts to historic properties, it will be necessary to mitigate those impacts.

**Mitigation Measure Culture-1 (CP4): Develop and Implement measures identified in an NHPA Section 106 MOA or PA** Avoid, minimize, or mitigate adverse effects through project redesign, when warranted, or through the development and implementation of an MOA or PA.



1                   These impacts would be less than significant after mitigation.

2                   **Mitigation Measure Culture-3 (CP4): Implement Mitigation Measure**  
3                   **Culture-1 (CP4): Develop and Implement measures identified in an NHPA**  
4                   **Section 106 MOA or PA** This mitigation measure is the same as Mitigation  
5                   Measure Culture-1 (CP4). Implementation of mitigation measure Culture-1  
6                   would reduce Impact Culture-3 (CP4) to a less than significant level.

7                   ***CP5 – 18.5-Foot Dam Raise, Combination Plan***

8                   As this alternative is likely to cause significant, adverse impacts to historic  
9                   properties, it will be necessary to mitigate those impacts.

10                  **Mitigation Measure Culture-1 (CP5): Develop and Implement measures**  
11                  **identified in an NHPA Section 106 MOA or PA** Avoid, minimize, or  
12                  mitigate adverse effects through project redesign, when warranted, or through  
13                  the development and implementation of an MOA or PA.

14                  These impacts would be less than significant after mitigation.

15                  **Mitigation Measure Culture-3 (CP5): Implement Mitigation Measure**  
16                  **Culture 1 (CP5): Develop and Implement measures identified in an NHPA**  
17                  **Section 106 MOA or PA** This mitigation measure is the same as Mitigation  
18                  Measure Culture-1 (CP5). Implementation of mitigation measure Culture-1  
19                  would reduce Impact Culture-3 (CP5) to a less than significant level.

20   **14.3.5 Cumulative Effects**

21                  While it may not be possible to predict all future impacts to cultural resources  
22                  within the study area, it is clear that raising Shasta Dam would result in  
23                  cumulative effects on historic properties. Such properties have already been  
24                  identified, and there are known ongoing effects.

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1 **Chapter 15**  
2 **Indian Trust Assets**

3 **15.1 Affected Environment**

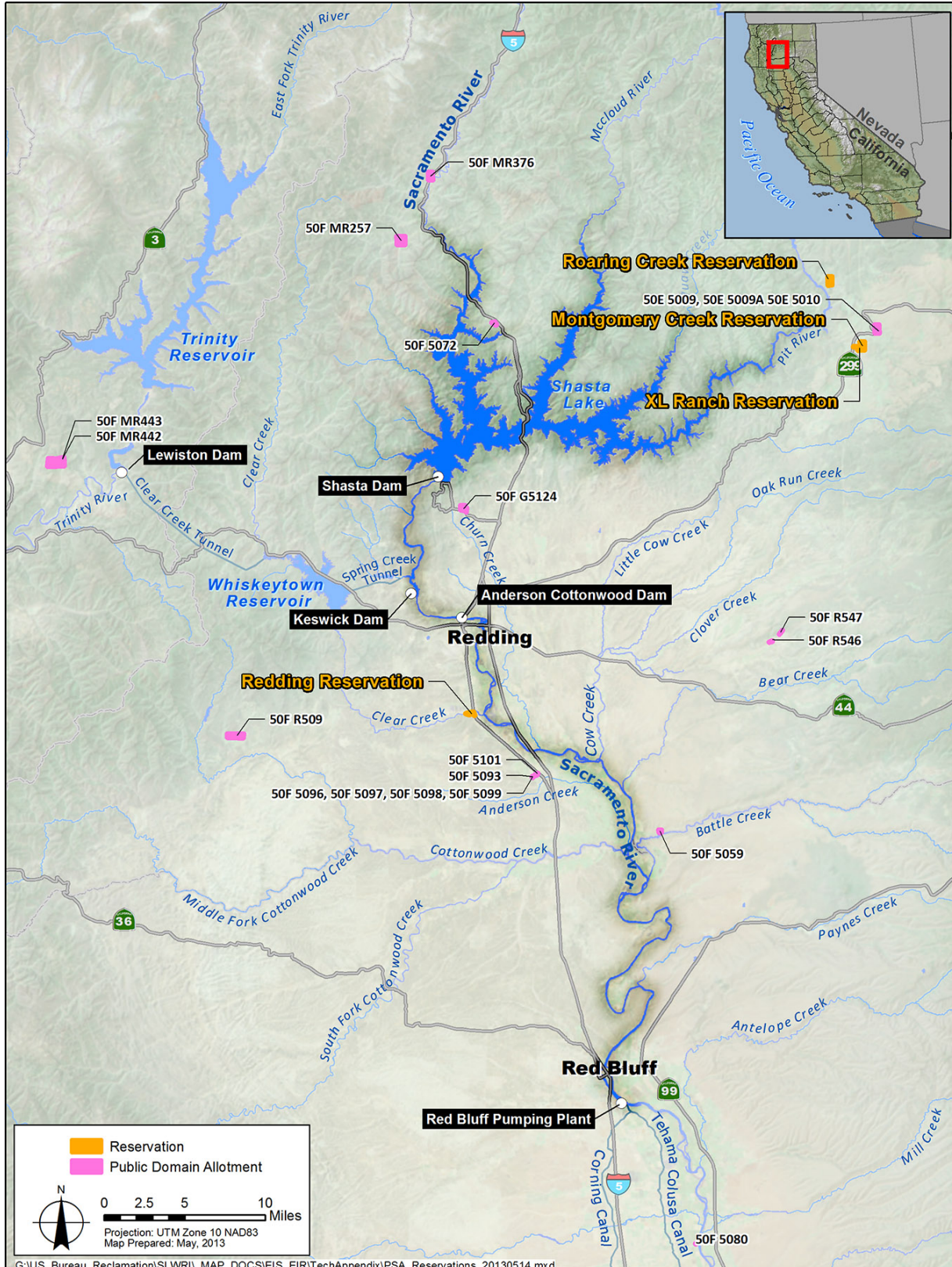
4 This section describes the affected environment related to Indian Trust Assets  
5 (ITA) for the proposed dam and reservoir modifications under SLWRI action  
6 alternatives.

7 The affected environment for ITAs is the primary study area, within which all  
8 construction activities will take place, and which includes Shasta Lake's  
9 expanded inundation area, relocations within approximately 0.25 miles of the  
10 shoreline, and the upper Sacramento River from Shasta Dam to the Red Bluff  
11 Pumping Plant.

12 The extended study area would only be affected by changes in CVP and SWP  
13 operations, and includes the Sacramento River to the Delta and the CVP and  
14 SWP water service areas. For additional details on the primary and extended  
15 study areas, please refer to Section 1.3 and Figures 1-1 and 1-2 of the DEIS.  
16 The action alternatives are not anticipated to have impacts on ITAs as a result of  
17 changes in CVP and SWP operations; therefore, the extended study area was  
18 not evaluated for ITAs.

19 Indian Trust Lands in the region around the primary study area are shown in  
20 Figure 15-1.

21 Several Federally recognized tribes are located in the region surrounding the  
22 primary study area (Table 15-1).



1  
 2 **Figure 15-1. Reservations, Rancherias and Public Domain Allotments in Primary Study**  
 3 **Area**

**Table 15-1. Federally Recognized Tribes in Region Surrounding Primary Study Area**

Tribe	Affiliation
Grindstone Indian Rancheria of Wintun- Wailaki Indians	Wintun, Wailaki
Paskenta Band of Nomlaki Indians	Nomlaki
Pit River Tribe Environmental Office	Pit River, Wintun
Pit River Tribe	Pit River Achumawi Wintun
Redding Rancheria	Wintu, Pit River, Yana

## 15.2 Regulatory Framework

ITAs are legal interests in property held in trust by the US for Federally recognized Indian tribes or individual Indians. An Indian trust has three components: (1) the trustee, (2) the beneficiary, and (3) the trust asset. ITAs can include land, minerals, Federally reserved hunting and fishing rights, Federally reserved water rights, and in-stream flows associated with trust land. Beneficiaries of the Indian trust relationship are Federally recognized Indian tribes with trust land; the United States is the trustee. By definition, ITAs cannot be sold, leased, or otherwise encumbered without approval of the United States. The characterization and application of the United States trust relationship have been defined by case law that interprets Congressional acts, executive orders, and historic treaty provisions.

The Federal Government, through treaty, statute, or regulation, may take on specific, enforceable fiduciary obligations that give rise to a trust responsibility to Federally recognized tribes and individual Indians possessing trust assets. Courts have recognized an enforceable Federal fiduciary duty with respect to Federal supervision of Indian money or natural resources, held in trust by the Federal Government, where specific treaties, statutes, or regulations create such a fiduciary duty.

Consistent with President William J. Clinton’s 1994 memorandum, *Government-to-Government Relations with Native American Tribal Governments* (Federal Register, Vol. 59, No. 85, May 4, 1994, pages 22951–22952), Reclamation assesses the effect of its programs on tribal trust resources and Federally recognized tribal governments. Reclamation is tasked to actively engage Federally recognized tribal governments and consult with such tribes on government-to-government level when its actions affect ITAs. The U.S. Department of the Interior Departmental Manual, Part 512.2 (1995), ascribes the responsibility for ensuring protection of ITAs to the heads of bureaus and offices. The Department of the Interior is required to “protect and preserve Indian trust assets from loss, damage, unlawful alienation, waste, and depletion” (Secretarial Order No. 3215, *Principles for the Discharge of the Secretary’s*

1                    *Trust Responsibility*, Reclamation 2000). It is the general policy of the  
2 Department of the Interior to perform its activities and programs in such a way  
3 as to protect ITAs and avoid adverse effects whenever possible. Reclamation  
4 complies with procedures contained in Departmental Manual, Part 512.2,  
5 guidelines, which protect ITAs. Reclamation carries out its activities in a  
6 manner that protects trust assets and avoids adverse impacts, when possible.  
7 When Reclamation cannot avoid adverse impacts, it will provide appropriate  
8 mitigation or compensation. Reclamation is responsible for assessing whether  
9 action alternatives CP1 through CP5 have the potential to affect ITAs.  
10 Reclamation will comply with procedures contained in Departmental Manual,  
11 Part 512.2, guidelines, which protect ITAs.

## 12    **15.3 Environmental Consequences and Mitigation Measures**

13                    This section discusses environmental consequences and potential mitigation  
14 associated with ITAs that could result from implementing the alternatives  
15 described in this DEIS.

### 16    **15.3.1 Methods and Assumptions**

17                    A detailed description of both the primary and extended study areas was  
18 provided to the Bureau of Indian Affairs' Regional ITA Coordinator. The  
19 Regional ITA Coordinator examined both the project area descriptions and  
20 records held by the Bureau of Indian Affairs and Reclamation, and determined  
21 that the proposed action does not have potential to affect ITAs. There are no  
22 ITAs in the primary study area.

### 23    **15.3.2 Direct and Indirect Effects**

24                    The following section describes the potential environmental consequences of  
25 the project.

#### 26                    ***No-Action Alternative***

27                    Under the No-Action Alternative, there are no impacts to ITAs because no new  
28 facilities would be constructed and existing operations would continue as  
29 historically.

#### 30                    ***CP1 Through CP5***

31                    There are no tribes possessing legal property interests held in trust by the United  
32 States in the study area for any of the proposed comprehensive plans (CP1  
33 through CP5). The nearest ITA is a Public Domain Allotment approximately 5  
34 miles north-northwest of the project location. This property would not be  
35 affected by inundation from the enlarged reservoir or have ground disturbing  
36 activities.

#### 37                    ***Cumulative Impacts***

38                    There are no impacts to ITAs as a result of the proposed action; therefore, the  
39 proposed action would not contribute to cumulative impacts to ITAs.

# Chapter 16

## Socioeconomics, Population, and Housing

### 16.1 Affected Environment

This chapter describes socioeconomics, population, and housing characteristics in the primary and extended study areas. For a more detailed discussion of the information presented in this chapter, see the *Socioeconomics, Population, and Housing Technical Report*.

#### 16.1.1 Socioeconomics

Socioeconomics covers age, race/ethnicity, income/poverty, employment and labor force, business and industry, and government and finance. For a more detailed discussion of the information presented in this chapter, see the *Socioeconomics, Population, and Housing Technical Report*.

##### ***Shasta Lake and Vicinity and Upper Sacramento River (Shasta Dam to Red Bluff)***

**Race/Ethnicity** In 2010, the white population represented more than 90 percent of the populations of Shasta and Tehama counties, but substantial increases were observed in many minority groups (U.S. Census Bureau 2010a). Tehama County’s minority populations also increased between 2000 and 2010. Trends observed in the two counties generally coincide with statewide trends; Hispanic, Asian-Pacific Islander, and American Indian populations all grew by more than 9 percent over the 10-year period.

**Income/Poverty** Jurisdictions within the primary study area have underperformed when compared to the statewide averages for income levels and poverty rates. Median household incomes in Shasta and Tehama counties were sizably lower than the statewide average in 2000 and 2010, although Shasta County experienced a substantial increase in the 10-year period. With median household incomes of \$42,931 and \$39,392 in 2010, respectively, Shasta and Tehama counties had incomes averaging between \$17,000 and \$20,000 less than the statewide average for 2010 (U.S. Census Bureau 2011a). Overall poverty rates and child poverty rates also have been higher in the primary study area than in California as a whole.

**Employment and Labor Force** Because of the cyclical nature of the area’s natural resource–related industries and other factors, Shasta and Tehama counties were characterized by substantially higher unemployment rates during the 1990s (Shasta County 2004). Unemployment rates in both counties have continued to increase and have exceeded state rates since 2007. From 2007

1 through 2010, unemployment rates in the two counties ranged between 1.8  
2 percent and 3.3 percent above the statewide rate. The two counties recorded  
3 similar unemployment rates (varying between 0.1 and 0.7 percent) since 2007.  
4 In 2010, Tehama County registered a 15.6 percent unemployment rate, while  
5 unemployment in Shasta County totaled 15.7 percent of the population (EDD  
6 2010a). As a result of its larger population, Shasta County maintained a labor  
7 force of just under 84,400 people in 2010, or more than three times that of  
8 Tehama County.

9 **Business and Industry** Economic activities in the primary study area coincide  
10 in many ways with the industrial composition of California as a whole.  
11 Education and health services, followed by governmental services made up the  
12 top two industrial sectors both locally and statewide in 2010. In Shasta and  
13 Tehama counties, employees in the education and health services, which  
14 includes teachers and health workers, and government employees accounted for  
15 more than 40 percent of the total workforce. Similarly, retail trade, which  
16 includes general merchandise stores, food and beverage stores, and other  
17 miscellaneous stores and retailers, also ranks in the top five industries in both  
18 counties and California generally.

19 Some differences also exist between the industrial makeup of the two counties  
20 and that of California as a whole. For example, manufacturing plays an  
21 important role in Tehama County (7.6 percent) and California (10.0 percent) as  
22 a whole, but a comparatively small role in Shasta County. Professional and  
23 business services registers as the third largest industry at the statewide level  
24 (12.5 percent), but represents a smaller portion of employment in Shasta County  
25 (9.7 percent) and Tehama County (7.0 percent). Additionally, farm employment  
26 makes up a sizeable portion of the total workforce in Tehama County (8.3  
27 percent), but accounts for a comparatively small portion of the workforce in  
28 Shasta County (3.1 percent) and California as a whole (2.3 percent).

29 Projections of future growth depict slightly different economic trends in Shasta  
30 and Tehama counties than at the statewide level. California's construction  
31 industry is expected to grow by 26 percent by 2020 (compared to 2010 levels),  
32 and the wholesale trade industry is expected to grow by more than 25 percent in  
33 that time. The construction industry represents the fifth largest growth industry  
34 in Tehama County (9.4 percent); however, it does not rank in the top growth  
35 industries in Shasta County. The wholesale trade industry also represents the  
36 fourth and third growth industries in Shasta and Tehama counties, respectively,  
37 but growth rates are expected to be less than the state rate (U.S. Census Bureau  
38 2011a).

39 Established businesses, along with new businesses that locate in the area, will  
40 play an important role in the expansion of the local economy, as projected by  
41 the State. Table 1-11 in the *Socioeconomics, Population, and Housing*  
42 *Technical Report* displays a number of the major employers in the primary  
43 study area. This list of employers includes a range of businesses with a payroll



1 of more than 500 people. Three of the 10 businesses provide health care to local  
2 residents. Other employers with a payroll of over 500 people include: a  
3 wholesale nursery; insurance, pest management, and fuel management  
4 companies; a college; a manufacturer of industrial materials (mill work); and a  
5 wholesale distributor, identified as employing more than 1,000 people (EDD  
6 2013a, 2013b).

7 **Government and Finance** Shasta and Tehama counties are the critical local  
8 governments in the primary study area. Each county has a primary urban center  
9 (Redding in Shasta County and Red Bluff in Tehama County), with a limited  
10 number of small cities and towns, and large amounts of rural land surrounding  
11 it. Because the two counties are largely rural, their total revenues and  
12 expenditures are relatively low when compared to other jurisdictions in  
13 California.

14 Revenues generated by Shasta County are used for a range of governmental  
15 activities. As described in the *Socioeconomics, Population, and Housing*  
16 *Technical Report*, expenditures increased from \$302.8 million in the 2007 –  
17 2008 fiscal year to \$319.7 million in the 2008 – 2009 fiscal year. Expenditures  
18 decreased substantially in the 2009 – 2010 fiscal year to \$309.6 million, as a  
19 result of decreased spending on transportation-related projects. Welfare, social  
20 services, and other public assistance have consistently been the largest  
21 expenditures for Shasta County (totaling more than \$94.1 million in 2010), but  
22 remained relatively constant between 2007 and 2010. Police, fire, and other  
23 public safety activities represented the second largest expenditure category with  
24 more than \$79.7 million in the 2009 – 2010 fiscal year.

25 Observed trends in Tehama County’s revenues and expenditures have been  
26 generally similar to those experienced in Shasta County. Because of its smaller  
27 size, Tehama County’s total revenues are substantially less than those of Shasta  
28 County (\$112.3 million in the 2009 – 2010 fiscal year, compared to \$309.6  
29 million in Shasta County), but Tehama County experienced an overall decrease  
30 in revenue growth between 2007 and 2010.

31 Expenditures in Tehama County also are consistent with the trends observed in  
32 Shasta County.

### 33 **Lower Sacramento River and Delta**

34 **Race/Ethnicity** Overall, the majority of people in the nine-county lower  
35 Sacramento River and Delta portion of the extended study area are white (57.4  
36 percent), but the proportion of population identified as white varies substantially  
37 between counties. In 2010, the white population of Glenn County (71.1 percent)  
38 was the highest proportion of any county in the area, while Sacramento and San  
39 Joaquin counties had the lowest proportion of white residents (51.0 percent)  
40 (U.S. Census Bureau 2010b). These proportions were less than that observed at  
41 the statewide level in 2010 (57.6 percent).

1                   **Income/Poverty** Income and poverty characteristics for the lower Sacramento  
2 River and Delta area are similar to those for California as a whole. The median  
3 household income of the majority of counties within the nine-county area is  
4 similar to or higher than the statewide median household income (\$59,641).

5                   Poverty levels for both individuals and children in the lower Sacramento River  
6 and Delta counties are similar to the statewide level. Sacramento (16.6 percent),  
7 San Joaquin (17.7 percent), Glenn (18.2 percent), Yolo (19.9 percent), and  
8 Butte (20.3 percent) had higher overall poverty rates than California as a whole  
9 (15.5 percent) in 2010 (U.S. Census Bureau 2011b). The percentage of people  
10 below the poverty level is expected to follow national and statewide economic  
11 trends.

12                   **Employment and Labor Force** Employment and labor trends in the nine  
13 lower Sacramento River and Delta counties generally are consistent with  
14 statewide trends. The area maintains a labor force of more than 1.9 million  
15 people, representing approximately 10 percent of California’s labor force (18.3  
16 million).

17                   In the nine-county area in 2010, approximately 13.2 percent of the labor force  
18 was classified as unemployed, as compared to 12.4 percent statewide for the  
19 same period. Although the total unemployment rate was only 0.8 percent greater  
20 than the state’s unemployment rate, unemployment within the lower  
21 Sacramento River and Delta counties varied substantially. Generally, the  
22 counties with the highest unemployment rates in 2010 had greater dependence  
23 on the agricultural industry and a reduced industrial diversity. Frequently,  
24 unemployment rates tend to be higher in rural areas than in urban areas, and  
25 farm workers commonly have seasonal and temporary jobs.

26                   **Business and Industry** Business and industry in the lower Sacramento River  
27 and Delta counties are composed primarily of five sectors: government;  
28 educational and health services; professional and business services; retail trade;  
29 and leisure and hospitality (U.S. Census Bureau 2011b). These consistently rank  
30 in the top five sectors of the nine lower Sacramento River and Delta counties.

31                   **Government and Finance** A total of 55 cities and towns and a range of  
32 special districts are located within the nine counties of the lower Sacramento  
33 River and Delta. This collection of governmental entities provides valuable  
34 public services to the lower Sacramento River and Delta area—education, fire  
35 protection, employment development, emergency services, and crime  
36 prevention and control. These agencies and special districts rely primarily on  
37 tax revenue disbursed by the State government, local sales and property taxes  
38 and fees, and the disbursement of Federal funds. This greater reliance on  
39 existing tax structures and rates, and a productive economic base, makes  
40 relatively reliable and affordable CVP and SWP water and power even more  
41 valuable, because its availability and affordability helps foster local business  
42 activity, and thus indirectly helps sustain the fiscal health of local service

1 providers. Similarly, flood protection provided by Shasta Dam helps protect and  
2 sustain the appraised value of property within the dam's floodplain, again  
3 helping to protect the fiscal health of local service providers.

4 Total revenues and expenditures vary substantially between the nine counties of  
5 the lower Sacramento River and Delta because of the relative sizes of the  
6 counties and the services they provide. Revenues include payments received  
7 through taxes, licenses and permits, grants from other governments, charges for  
8 services, and others. Expenditures include payments made by a jurisdiction to  
9 buy goods, pay its employees, and provide services to its residents. Glenn  
10 County had the smallest total of revenues and expenditures, each at \$82.2  
11 million for 2009-2010, while Sacramento County had the greatest total of  
12 revenues and expenditures at \$2.4 billion and \$2.5 billion, respectively, for  
13 2009-2010 (Glenn County 2009; Sacramento County 2009).

#### 14 **CVP/SWP Service Areas**

15 **Race/Ethnicity** The population within the CVP and SWP service areas  
16 continues to diversify. The proportion of the statewide population made up of  
17 minority groups has been steadily increasing. The population of individuals in  
18 California who identify themselves as Asian-Pacific Islander or multiracial  
19 experienced double-digit population growth between 2000 and 2010 (U.S.  
20 Census Bureau 2002, 2010b). Hispanics are the largest minority population in  
21 California and many members of this ethnic group work on farms that receive  
22 some or all of their water from the CVP and SWP.

23 **Income/Poverty** Poverty levels for both individuals and children in California  
24 increased slightly between 2000 and 2010. The percentage of people below the  
25 poverty level is expected to follow national and statewide economic trends.

26 **Employment and Labor Force** Employment and labor force trends observed  
27 in the CVP and SWP service areas generally are synonymous with the trends  
28 observed at the statewide level because of the expanse of the CVP and SWP  
29 service areas. California's total labor force increased consistently from year to  
30 year between 2007 and 2010. Between 2007 and 2008, the labor force increased  
31 by approximately 282,100 individuals, which was the largest annual increase  
32 over the 4-year period. Between 2009 and 2010, the labor force increased by  
33 approximately 108,100 individuals. California's total labor force exceeded 18.3  
34 million in 2010.

35 Although increases in the state's total labor force were relatively consistent, the  
36 state's unemployment rate fluctuated between 2007 and 2010. The state's  
37 unemployment rate was 5.4 percent in 2007 and increased steadily over the next  
38 4 years to 12.4 percent. This increase in the unemployment rate at the state level  
39 coincided with similar national employment trends (EDD 2010a).

40 **Business and Industry** Business and industry trends for the CVP and SWP  
41 service areas are assumed to be equal to those at the statewide level because of

1 the expanse of these service areas. The education and health services sector  
2 represents the largest industry in California, measured by total employees.  
3 Government is California's second largest work sector, and the retail trade,  
4 professional and business services, and leisure and hospitality industries all play  
5 important roles in the state's economy.

6 **Government and Finance** The state of California represents the most  
7 appropriate level of detail for the CVP and SWP service areas because of the  
8 expanse of the service areas and the interdependent nature of government and  
9 finance provision. California currently ranks as the seventh largest economy in  
10 the world and provides goods and services to more than 38 million people,  
11 making it the largest state in the nation. As a result, State government manages  
12 a large annual volume of revenues and expenditures. The State of California's  
13 adopted 2012–2013 budget includes a total of approximately \$132.9 billion in  
14 revenues and transfers and \$142.4 billion in total expenditures (State of  
15 California 2012). Many of the State's expenditures represent grants and other  
16 funding, made available to local jurisdictions throughout California. These  
17 funds may be used for a variety of services, such as health and human services,  
18 environmental protection, and resource management.

## 19 **16.1.2 Population**

### 20 ***Shasta Lake and Vicinity and Upper Sacramento River (Shasta Dam to*** 21 ***Red Bluff)***

22 The area surrounding Shasta Dam includes generally smaller cities and towns  
23 with two larger, primary urban areas in each of the two counties (Shasta County  
24 and Tehama County). Almost 39 percent of the population in Shasta County and  
25 more than 65 percent in Tehama County lived in unincorporated areas in 2010.  
26 By comparison, only 17.2 percent of the population in the entire state of  
27 California lived in unincorporated areas in 2010. In total, the populations of  
28 Shasta and Tehama counties make up less than 1 percent of the total population  
29 in California.

30 The cities of Redding and Red Bluff are the two largest urban areas in the  
31 primary study area. Redding, with a total of 91,561 residents in 2010, is the  
32 most populous city in the region. Red Bluff is the second largest city in the  
33 region and the largest city in Tehama County, with a total of 13,825 residents in  
34 2010. Remaining cities within the primary study area – Anderson, Shasta Lake,  
35 and Tehama – all contained fewer than 11,000 residents in 2010.

36 Although Shasta and Tehama counties are still comparatively small, both  
37 counties have been growing substantially over the past 15-20 years. Since 1990,  
38 the population of Shasta County has increased by more than 25 percent. During  
39 that time, the populations of Redding and Anderson have increased by  
40 approximately 38 percent and 30 percent, respectively. A similar situation has  
41 been observed in Tehama County, where the total population has grown by

1 more than 27 percent since 1990. Most of this new growth has occurred in the  
2 unincorporated areas of Tehama County, rather than in its cities.

3 Shasta and Tehama counties are expected to continue this growth trend, with  
4 substantial growth in Tehama County. The State of California projects that  
5 Shasta County's population will increase by 27 percent by 2050, to a total of  
6 approximately 233,500 residents (DOF 2012). This increase is less than that  
7 total expected at the statewide level (32.0 percent). Tehama County is expected  
8 to have a larger population increase compared to the state level, where the  
9 population is expected to increase approximately 44 percent between 2010 and  
10 2050 (DOF 2012).

### 11 **Lower Sacramento River and Delta**

12 As described in the *Socioeconomics, Population, and Housing Technical*  
13 *Report*, roughly 4 million people live in the nine-county area that makes up the  
14 lower Sacramento River and Delta area (Butte, Colusa, Contra Costa, Glenn,  
15 Sacramento, San Joaquin, Sutter, and Yolo counties). This population represents  
16 approximately 11 percent of California's total population. Sacramento County  
17 and Contra Costa County are the two largest counties in the area, with  
18 approximately 1.4 million and 1.0 million residents, respectively, in 2010 (DOF  
19 2010). All of the nine-county area is expected to grow at a faster rate than  
20 California as a whole (32.0 percent increase) through 2050. Population  
21 increases of at least 34 percent are expected in all nine counties in the area, over  
22 that time (DOF 2012).

### 23 **CVP/SWP Service Areas**

24 In 2010, California contained a total of 38.7 million residents. Approximately  
25 80 percent of the state's population resided in the incorporated areas of its 58  
26 counties (DOF 2010). Similar to the state as a whole, most of the population of  
27 the CVP and SWP service areas is concentrated within urban areas. Outside of  
28 these fast-growing population centers, most of the lands within the CVP and  
29 SWP service areas are rural, with irrigated agriculture being the predominant  
30 land use and driver of the local and regional economies.

31 California's population has increased by almost 25 percent since 1990, and it is  
32 projected to increase by approximately 32 percent to more than 51 million  
33 people by 2050. This substantial population increase will result in a sizeable  
34 increase in water and energy demand across the state. The proportion of the  
35 statewide population made up of minority groups has been steadily increasing.

## 36 **16.1.3 Housing**

### 37 **Shasta Lake and Vicinity and Upper Sacramento River (Shasta Dam to** 38 **Red Bluff)**

39 As shown in the *Socioeconomics, Population, and Housing Technical Report*,  
40 as would be expected, provision of housing in the primary study area generally  
41 coincides with the population trends discussed above. Shasta County (77,857

1 units in 2010) maintains almost three times the amount of housing units as that  
2 of Tehama County (27,729 units) (DOF 2010). Of the nearby cities, Redding  
3 provides the largest supply of housing in the region, with more than 38,000  
4 housing units. Redding's units represent roughly half the total housing units in  
5 Shasta County. Red Bluff provides the second largest housing stock in the area,  
6 with more than 6,000 units. Within Redding and Anderson, the increase in  
7 housing units between 1990 and 2010 was substantially greater than the  
8 percentage increase at the state level (21.5 percent). Redding observed the  
9 greatest increase in housing units since 1990 (40.9 percent).

10 Overall, single-family dwelling units are the predominant housing type in the  
11 primary study area. Vacancy rates generally were higher than the statewide  
12 average (5.9 percent), with the exception of Redding (5.0 percent) and  
13 Anderson (5.8 percent). Tehama County registered the highest vacancy rate in  
14 the primary study area, with 10.9 percent of all its housing units vacant. The  
15 average household size in jurisdictions of the primary study area ranged from as  
16 low as 2.33 persons per household (Tehama) to as high as 2.64 persons per  
17 household (Anderson and Shasta Lake). All of these totals were lower than the  
18 average number of persons per household at the statewide level (2.96 persons).

#### 19 **Lower Sacramento River and Delta**

20 As shown in the *Socioeconomics, Population, and Housing Technical Report*,  
21 housing characteristics in the nine lower Sacramento River and Delta counties  
22 generally are similar to those at the statewide level. In 2010, the area contained  
23 approximately 1.6 million housing units. Similar to population, this total  
24 represents approximately 11 percent of California's housing stock  
25 (approximately 14 million houses). Overall, single-family housing makes up a  
26 larger proportion of the total housing stock in the nine-county area (72.7  
27 percent) than recorded at the statewide level (64.4 percent) in 2010 (DOF 2010).

28 The vacancy rate in the nine-county area in 2010 was higher (5.3 percent) than  
29 the rate observed at the statewide level (4.8 percent). Vacancy in the majority of  
30 counties (six of nine counties) within the lower Sacramento River and Delta  
31 area was substantially lower than California as a whole (DOF 2010).

32 Average household size in the lower Sacramento River and Delta area is  
33 generally lower than that observed at the statewide level. In total, an average of  
34 2.82 persons lived in the households of the nine-county area in 2010. This  
35 compared to an average of 2.96 persons for California as a whole (DOF 2010).

#### 36 **CVP/SWP Service Areas**

37 A description of housing in the CVP and SWP service areas is not included  
38 because it would not be affected by the project.

## 1 16.2 Regulatory Framework

2 The analysis of socioeconomic resources is guided primarily by Federal laws  
3 and policies. State and local laws and policies typically promote economic  
4 development and diversity, environmental justice, public health and safety,  
5 housing, and address the concerns of the residents within their jurisdictions. As  
6 noted in the following discussion, NEPA documents must include an  
7 assessment of potential conflicts with State and local plans and policies.

### 8 16.2.1 Federal

9 The major Federal laws and regulations guiding the assessment of  
10 socioeconomic resources are summarized below.

#### 11 ***National Environmental Policy Act***

12 Section 102 of NEPA requires Federal agencies to “insure the integrated use of  
13 the natural and social sciences” in planning and decision making (42 U.S. Code  
14 Section 4332).

15 Section 1502.16(c) of NEPA requires Federal agencies to identify potential  
16 conflicts between a proposed action and related plans and policies of Federal,  
17 State, and local agencies and Indian tribes. This requirement helps Federal  
18 agencies identify potential conflicts that may cause adverse effects on the social  
19 and economic environment of a study area because many agency and tribal  
20 plans and policies are designed to protect the people residing within their  
21 jurisdictions and/or the local economy they depend on for their economic  
22 livelihoods.

#### 23 ***Council on Environmental Quality***

24 The Council on Environmental Quality’s “Regulations for Implementing the  
25 Procedural Provisions of NEPA” (40 Code of Federal Regulations (CFR)  
26 Sections 1500–1508) provide guidance related to social and economic impact  
27 assessment by noting that the “human environment” assessed under NEPA is to  
28 be “interpreted comprehensively” to include “the natural and physical  
29 environment and the relationship of people with that environment” (40 CFR  
30 1508.14). Furthermore, these regulations require agencies to assess “aesthetic,  
31 historic, cultural, economic, social, or health” effects, whether direct, indirect,  
32 or cumulative (40 CFR 1508.8). Some Federal agencies, including the  
33 U.S. Bureau of Land Management and U.S. Forest Service, have developed  
34 socioeconomic-related handbooks and instructional memoranda to help EIS  
35 preparers comply with NEPA, with respect to socioeconomic resources.

#### 36 ***Executive Order 12898 – Environmental Justice***

37 In 1994, President Bill Clinton issued Executive Order 12898 regarding  
38 environmental justice. It requires Federal agencies to “identify and address”  
39 disproportionately high and adverse human health or environmental effects of  
40 their programs, policies, and activities on minority populations and low-income  
41 populations in the United States. The Council on Environmental Quality issued

1 guidance in 1997, to help Federal agencies incorporate environmental justice  
2 concerns into their NEPA procedures. Environmental justice issues are  
3 specifically addressed in Chapter 24, “Environmental Justice,” of this DEIS.

#### 4 **16.2.2 State**

5 Most state and local governments have plans and policies intended to protect  
6 and expand local and regional economies affecting the communities and  
7 residents within their jurisdictions. Some of these plans and policies also are  
8 intended to promote public health and safety while minimizing conflicts  
9 between new development projects of all types; their associated traffic, air, and  
10 noise impacts; and the social environment within which local residents live and  
11 work. State plans and policies also frequently address other social and economic  
12 impact topics, including fiscal conditions and related public services that affect  
13 local residents’ quality of life.

14 In California, the California Environmental Protection Agency adopted its own  
15 environmental justice policy in 2004. Pursuant to Sections 71110–71113 of the  
16 California Public Resources Code, the agency has developed this policy (or  
17 strategy) to provide guidance to its resource boards, departments, and offices. It  
18 is intended to help achieve the State’s goal of “achieving fair treatment of  
19 people of all races, cultures and incomes with respect to the development,  
20 adoption, implementation and enforcement of environmental laws and policies.”

#### 21 **16.2.3 Regional and Local**

22 Each of California’s counties, including Shasta and Tehama counties, has its  
23 own plans, ordinances, and other policies designed to protect and improve a  
24 wide range of socioeconomic conditions. Specifically addressed in these plans,  
25 ordinances, and policies are housing; employment opportunities for minorities  
26 and low-income populations, and others; economic diversification; and business  
27 activity in general.

##### 28 ***Shasta County***

29 **Shasta County General Plan** Two primary elements of the Shasta County  
30 General Plan (Shasta County 2004) address socioeconomic resources: Housing,  
31 and Economic Development. The Housing Element of the Shasta County  
32 General Plan (Shasta County 2011) establishes several goals and policies related  
33 to ensuring adequate housing provision, especially affordable housing, in the  
34 county. Shasta County’s housing policies and programs are grouped into six  
35 primary categories, each supporting an identified goal. These categories and the  
36 goal associated with each are as follows:

- 37 • **Housing Supply**

- 38 – **Goal** – To establish and implement policies and programs that will:

- 39     ▪ Contribute to the provision of an adequate supply and diversity  
40     of safe, healthy, and affordable housing for all income levels to



1 meet the needs of residents in the unincorporated areas of  
2 Shasta County.

3       ▪ Satisfy the requirements of the Regional Housing Needs  
4 Allocation Plan for Shasta County for the 2004-2009 Housing  
5 Element period, specifically to realize the construction of new  
6 units as follows: Very Low Income – 300 units; Low Income –  
7 255 units; Moderate Income – 1,035 units; and Above  
8 Moderate Income – 810 units.

9       • **Conserve and Improve Existing Affordable Housing**

10       – **Goal** – To conserve, improve, and expand the inventory of existing  
11 affordable housing stock in the incorporated areas of the County,  
12 specifically to realize the conservation and/or rehabilitation of the  
13 following units: Rehabilitation (150): 60 units – Very Low Income;  
14 55 units – Low Income; 25 units – Moderate Income; and 10 units –  
15 Above Moderate Income; Conservation (150): 90 units – Very Low  
16 Income; 53 units – Low Income; and 7 units – Moderate Income.

17       • **Housing Development Constraints**

18       – **Goal** – To continue to remove all County constraints, as is practical  
19 and legal, which have the potential to hinder or impede the  
20 development of affordable housing projects.

21       • **Special Needs**

22       – **Goal** – To continue to work collectively with local agencies to  
23 enhance and expand the outreach programs designed to provide  
24 accessible and affordable housing, including supportive services,  
25 for those persons with special needs including the elderly, large  
26 families, single mothers, children, developmentally and physically  
27 disabled persons, the mentally ill, farmworkers, and the homeless.

28       • **Energy Conservation**

29       – **Goal** – To explore, implement, and promote energy conservation  
30 practices in all eligible existing and new housing projects.

31       • **Fair Housing**

32       – **Goal** – To continue to utilize all feasible means to promote, expand,  
33 and ensure equal access to available, safe, decent, affordable  
34 housing opportunities in the unincorporated area without bias or  
35 prejudice for any reason for all economic segments of the County.

1 The Economic Development Element of the Shasta County General Plan  
2 (Shasta County 2004) establishes the following two overall objectives for  
3 economic development:

- 4 • **ED-1** – Economic development plans, programs, and policies shall  
5 contribute to a stable and healthy economy in Shasta County, which  
6 includes provision of a land development pattern, planning process, and  
7 regulatory atmosphere conducive to maintaining employment  
8 opportunities for County residents and fostering new economic  
9 development.
- 10 • **ED-2** – Seek economic diversity that increases the variety, type and  
11 scale of business, industrial, and manufacturing activities.

12 To support these objectives, Shasta County has established three primary  
13 policies for implementation. These policies emphasize the reuse and  
14 revitalization of existing development and full use of existing infrastructure for  
15 new business opportunities. To attract business to Shasta County, a number of  
16 incentive programs are employed, including community development block  
17 grants, economic assistance through a county redevelopment agency, and  
18 business development and retention assistance through an economic  
19 development corporation. Additionally, a 50-square-mile, State-defined  
20 enterprise zone (one of only 39 in California) has been designated in portions of  
21 Redding, Shasta Lake, Anderson, and unincorporated Shasta County. Enterprise  
22 zones are generally designated in locations characterized by high poverty rates.  
23 Businesses locating within these areas may receive State-supported incentives,  
24 such as sales and use tax credits, hiring assistance tax credits, and special  
25 business expense deductions (Shasta County 2004).

### 26 ***Tehama County***

27 In the Tehama County General Plan, updated in 2009 (Tehama County 2009),  
28 Tehama County set out three “fundamental concepts” that relate to population  
29 growth and demographic shifts: (1) accommodating growth, but not limiting  
30 growth or accepting uncontrolled growth; (2) locating major growth along the  
31 Interstate 5 transportation corridor; and (3) organizing growth according to a  
32 range of community types. These concepts emphasize where Tehama County  
33 expects to locate new growth and how they plan to accommodate it.  
34 Specifically, the Interstate 5 corridor plays a significant role for the placement  
35 of new development, and Tehama County attempts to provide a range of  
36 housing types for the diversity of needs created within the community. This  
37 emphasis on housing diversity may become more crucial as aging residents’  
38 housing preferences change.

39 The following housing-related goals in the general plan are relevant to the  
40 project:

- 1                   • **Goal HE-3: Adequate Sites** – Ensure the provision of adequate sites  
2                   and facilities to support future housing needs.
  
- 3                   • **Goal HE-5: Housing Conservation** – Work to improve, maintain and  
4                   conserve the County’s existing housing stock.
  
- 5                   • **Goal HE-6: Addressing Constraints** – Address and wherever possible  
6                   remove, governmental constraints to the maintenance, improvement, or  
7                   development of housing to meet the needs of County residents.
  
- 8                   • **Goal HE-7: Fair Housing/Equal Opportunity** – Promote equal  
9                   housing opportunities for all persons without discrimination regardless  
10                  of age, race, sex, marital status, ethnic background, household  
11                  composition, sources of income, or other arbitrary factors.

12                  Relevant economic development-related goals contained in the draft general  
13                  plan are as follows:

- 14                  • **Goal ED-3** – Expand the economic base while maintaining a healthy  
15                  and diverse local economy that meets the present and future  
16                  employment, shopping, recreational, public safety, and service needs of  
17                  Tehama County residents.
  
- 18                  • **Goal ED-4** – Work toward providing adequate infrastructure to support  
19                  commercial, industrial, and recreational development within Tehama  
20                  County including clean-up of contaminated industrial sites.
  
- 21                  • **Goal ED-7:** Protect and enhance environmentally sensitive lands and  
22                  natural resources while, at the same time, promoting business  
23                  expansion, retention, and recruitment.

24                  Shasta and Tehama counties function as the primary agencies responsible for  
25                  implementing policies and programs aimed at addressing employment and labor  
26                  force issues within the project’s primary study area.

### 27   **16.3 Environmental Consequences and Mitigation Measures**

28                  Based on the review of the affected environment provided in Section 16.1 of  
29                  this chapter, this section describes the potential environmental consequences  
30                  resulting from each of the proposed alternatives. Direct, indirect, and  
31                  cumulative effects of the alternatives are discussed below. When potential  
32                  environmental consequences are identified, specific mitigation measures to  
33                  offset the potential effects of the alternatives are presented. Potential effects and  
34                  mitigation measures address topics related to population, demographics, and  
35                  housing, employment and labor force, business and industry, and government  
36                  and finance.

## 1 **16.3.1 Methods and Assumptions**

### 2 ***Population, Housing, and Demographics***

3 The analysis of the potential impacts of the project alternatives on population,  
4 housing, and demographic characteristics was based on a review of published  
5 material pertaining to the primary and extended study areas. California  
6 Department of Finance population and demographics databases and projections,  
7 U.S. Census Bureau population and demographics data, the general plans of  
8 jurisdictions within the study areas, and other similar source documents were  
9 reviewed.

10 Population effects were evaluated based on changes in the total number of  
11 temporary and/or permanent residents likely to result from construction and  
12 operations activities that would be performed as part of project implementation.  
13 Housing effects were assessed based on estimated short- and long-term housing  
14 needs resulting from population changes, expected as a result of the project's  
15 construction and operational activities. Effects of the project on local and  
16 regional demographic characteristics were assessed quantitatively, when  
17 available data allowed. When quantitative analysis of effects was not possible at  
18 this broader geographic level, qualitative effects were identified based on the  
19 projected makeup (e.g., ethnicity, economic class) of any population changes  
20 expected to result from project implementation.

### 21 ***Employment and Labor Force***

22 The determination of potential impacts on employment and the labor force was  
23 based on a review of relevant information related to current conditions.  
24 Documents such as the California Employment Development Department's  
25 employment and labor force databases, the Economic Development and  
26 Housing elements of the Shasta County General Plan (2004), and the Tehama  
27 County General Plan Update (2009) were reviewed, along with estimates of  
28 employment (temporary and permanent jobs created) for each proposed  
29 alternative.

30 To quantify the potential job creation resulting from each proposed alternative,  
31 IMPLAN (IMpact analysis for PLANning model, Version 3.0.17.2) modeling  
32 was performed. IMPLAN modeling uses a branch of economics known as  
33 Input/Output analysis originally developed from the analytical work conducted  
34 by Wassily Leontief in the late 1930s,. Input/Output models are essentially  
35 accounting tables that trace the linkages of interindustry purchases and sales  
36 within a specific region, and within a given year. The Input/Output model yields  
37 "multipliers" that are used to calculate the total direct, indirect, and induced  
38 effects on jobs, income, and output generated per dollar of spending on various  
39 types of goods and services in the local economic study area. IMPLAN was  
40 originally developed by the U.S. Forest Service and now is maintained and  
41 marketed by the Minnesota IMPLAN Group, Inc.

1 The IMPLAN modeling incorporated project construction-related economic  
2 activity in the four-county region surrounding Shasta Lake. The primary set of  
3 effects analyzed using the regional model was how project construction would  
4 affect output, personal income, and employment within the four-county area  
5 containing the dam and reservoir. The project costs and duration over which  
6 construction activity would take place were developed for each comprehensive  
7 plan. The costs were organized into categories to assess the required investment  
8 that would take place in certain primary sectors of the local economy, namely  
9 concrete- and steel-related manufacturing, rock and aggregate, and dam and  
10 non-residential construction.

11 Several specific assumptions were necessary to complete IMPLAN modeling of  
12 the project. The following assumptions were used:

- 13 • IMPLAN modeling was completed for CP1 (which involves raising  
14 Shasta Dam by 6.5 feet); CP2 (which involves raising the dam by 12.5  
15 feet); and CP3, CP4, and CP5 (all of which involve raising the dam by  
16 18.5 feet).
- 17 • A construction period of approximately 4.5 years was assumed under  
18 CP1, and 5 years under CP2, CP3, CP4, and CP5.
- 19 • The “local economic study area” was defined as the four-county area of  
20 Shasta, Siskiyou, Tehama, and Trinity counties.
- 21 • A total labor force of 300 construction workers would be needed for  
22 CP1 and CP2, 350 construction workers would be needed for CP3 and  
23 CP4, and 360 construction workers would be needed for CP5.
- 24 • All 300–360 construction workers would be drawn directly from the  
25 local economic study area (used in IMPLAN modeling). (High  
26 unemployment in the primary study area and the availability of  
27 necessary worker skill sets supports this assumption.)

28 In addition to IMPLAN modeling, the Statewide Agricultural Production  
29 (SWAP) model, Version 6, was used to determine the effects of the five action  
30 alternatives on CVP and SWP agricultural users. The SWAP model is a regional  
31 economic model of irrigated agricultural production that simulates the decisions  
32 of agricultural producers (farmers) in the Central Valley of California. The  
33 model included 27 crop production regions in the Central Valley and 20  
34 categories of crops. Based on the changes in water availability expected with  
35 each alternative, the SWAP model predicted cropping patterns, land use, and  
36 water use in the Central Valley. These predictions then were used to calculate  
37 expected changes in net income resulting from each alternative during dry, wet,  
38 and average water years.<sup>1</sup> Although the model’s income-related projections

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<sup>1</sup> Throughout this document, water year types are defined according to the Sacramento Valley Index Water Year Hydrologic Classification unless specified otherwise.

1 were generally used to determine effects on business and industrial activity, the  
2 overall change in business net income (or profits) is a good indicator for  
3 potential changes in employment opportunities in affected sectors.

4 Additional information on methods and assumptions for the IMPLAN and  
5 SWAP models is provided in the Modeling Appendix.

### 6 ***Business and Industry***

7 The discussion of potential impacts on business and industry is based on a  
8 review of relevant information on current conditions, specifically California  
9 Employment Development Department documents, the Economic Development  
10 Element of the Shasta County General Plan (2004), the Tehama County General  
11 Plan Update (2009), and estimates of business and industry effects for each  
12 action alternative.

13 To quantify the potential effect on job creation and personal incomes resulting  
14 from each action alternative, IMPLAN modeling was completed by  
15 Reclamation economists. A description of IMPLAN modeling, generally, and  
16 the specific assumptions used, related to the project, are provided in the  
17 previous section.

### 18 ***Government and Finance***

19 The determination and discussion of potential impacts on government and  
20 finance was based on a review of relevant information on existing conditions,  
21 specifically the Economic Development Element of the Shasta County General  
22 Plan (2004), the Tehama County General Plan Update (2009), and estimates of  
23 local government and finance effects for each dam-raise alternative.

24 Because no quantitative analysis of the effect of the action alternatives on local  
25 government and finance has been completed yet, this analysis depends heavily  
26 on a qualitative discussion of potential impacts. Areas of potential impacts were  
27 identified by comparing existing conditions and probable future conditions. In  
28 many cases, the estimates completed as part of the IMPLAN and SWAP  
29 modeling served as the basis for impact estimates. These two models determine  
30 expected trends in employment, personal incomes, business incomes,  
31 agricultural production, and other data types to quantifiably estimate the  
32 impacts of the proposed alternatives. Because these local characteristics directly  
33 influence activities at the local level, they represent critical considerations in the  
34 analysis and conclusions presented in this section.

## 35 **16.3.2 Criteria for Determining Significance of Effects**

36 An environmental document prepared to comply with NEPA must consider the  
37 context and intensity of the environmental effects that would be caused by, or  
38 result from, the proposed action. Under NEPA, the significance of an effect is  
39 used solely to determine whether an EIS must be prepared. An environmental  
40 document prepared to comply with CEQA must identify the potentially  
41 significant environmental effects of a proposed project. A “[s]ignificant effect

1 on the environment means a substantial, or potentially substantial, adverse  
2 change in any of the physical conditions within the area affected by the project”  
3 (State CEQA Guidelines, Section 15382). CEQA also requires that the  
4 environmental document propose feasible measures to avoid or substantially  
5 reduce significant environmental effects (State CEQA Guidelines, Section  
6 15126.4(a)).

7 The following significance criteria were developed based on guidance provided  
8 by the State CEQA Guidelines, and consider the context and intensity of the  
9 environmental effects as required under NEPA. Impacts of an alternative on  
10 socioeconomics, population, and housing would be significant if project  
11 implementation would do any of the following:

- 12 • Induce substantial population growth in an area, either directly (for  
13 example, by proposing new homes and businesses) or indirectly (for  
14 example, through extension of roads or other infrastructure)
- 15 • Displace substantial numbers of people or housing, necessitating the  
16 construction of replacement housing elsewhere
- 17 • Produce a substantial burden on the existing housing stock within the  
18 local community because of an increased housing demand created by  
19 nonlocal project employees
- 20 • Require sizeable numbers of new workers in a particular industrial  
21 sector from outside the local area during construction or operation for  
22 effective implementation
- 23 • Substantially increase the risk of housing or other property damage  
24 caused by flooding
- 25 • Cause a substantial decrease in the number of opportunities for  
26 temporary or long-term direct employment within the primary study  
27 area or the extended study area (within Shasta County, Tehama County,  
28 or nearby cities and towns, specifically Redding, Anderson, Shasta  
29 Lake, and Red Bluff)
- 30 • Compete with established industries for workers within the labor force  
31 or associated resources to the extent that a shortage of workers  
32 available to related businesses would exist
- 33 • Cause a substantial decrease in the number of opportunities for  
34 temporary or long-term increases in personal and/or disposable  
35 incomes within the primary or extended study area (within Shasta  
36 County, Tehama County, or nearby cities and towns, specifically  
37 Redding, Anderson, Shasta Lake, and Red Bluff)

- 1                   • Considerably decrease the sales and/or incomes of businesses in the  
2                   primary or extended study areas

3                   Significance statements are relative to both existing conditions (2005) and  
4                   future conditions (2030), unless stated otherwise.

### 5   **16.3.3 Topics Eliminated from Further Discussion**

6                   In contrast to the primary study area and the lower Sacramento River and Delta  
7                   portion of the extended study area, additional flood control capacity provided by  
8                   the action alternatives is not expected to substantially affect the CVP and SWP  
9                   service areas beyond the lower Sacramento River and Delta. Dam operations  
10                  (i.e., storage and release scenarios) in the CVP and SWP service areas are  
11                  expected to continue, according to management plans similar to those currently  
12                  in place. Therefore, no flood-related impact on population and housing would  
13                  occur in the CVP and SWP service areas. This topic is not discussed further  
14                  under CP1–CP5.

### 15   **16.3.4 Direct and Indirect Effects**

16                  Similar to the approach used in Section 16.1, “Affected Environment,” the  
17                  following discussion of environmental consequences in the primary study area  
18                  does not separate Shasta Lake and vicinity from the upper Sacramento River  
19                  (Shasta Dam to Red Bluff) because of the regional interdependence of their  
20                  socioeconomic characteristics. Instead, environmental consequences are  
21                  discussed for the entire primary study area and the two counties that encompass  
22                  it, Shasta and Tehama counties.

#### 23                  ***No-Action Alternative***

24                  Under the No-Action Alternative, no additional Federal action would be taken  
25                  to address water reliability issues or increase anadromous fish survival.  
26                  Therefore, Shasta Dam and Shasta Lake would continue to operate as they  
27                  currently do, with some modifications (currently not known) expected in the  
28                  future. With the No-Action Alternative, water reliability is expected to become  
29                  an increasing issue as demand for water increases to meet the needs of  
30                  California’s growing population. Over time, water conservation and reuse  
31                  efforts would increase, and water provision is expected to shift from such areas  
32                  as agricultural production to urban uses. Environmental restoration, flood  
33                  control, and hydropower generation are expected to continue similar to existing  
34                  conditions. Like water demand, electricity demand in California is expected to  
35                  increase substantially in the future. This increased demand is expected to create  
36                  localized shortages in energy availability over time.

37                  **Shasta Lake and Vicinity and Upper Sacramento River (Shasta Dam to**  
38                  **Red Bluff)** Under the No-Action Alternative, population, demographics, and  
39                  housing conditions are expected to continue following the current growth trends  
40                  described in Section 16.1, “Affected Environment”; the projected employment  
41                  and labor force characteristics summarized in Section 16.1 also would continue.  
42                  The relatively large number of new construction-related jobs that would be



1 created by all five action alternatives would not be created. Therefore, this  
2 alternative would have no impact on population and housing or on employment  
3 and the labor force.

4 In addition, the business and industrial activity in the primary study area would  
5 continue, as summarized in Section 16.1. The relatively large and temporary  
6 increase in business activity that would occur during project construction would  
7 not occur. Therefore, the No-Action Alternative would have no impact on  
8 business and industrial activity.

9 Furthermore, the local government and finance conditions and trends, projected  
10 in Section 16.1, would continue because new facilities would not be constructed  
11 and existing facilities would not be altered, expanded, or demolished. The  
12 positive fiscal effects associated with the increase in sales and income tax  
13 revenue from construction-related spending would not occur. Therefore, the No-  
14 Action Alternative would have no impact on government and finance.

15 **Lower Sacramento River and Delta** Under the No-Action Alternative, the  
16 projected population, demographics, and housing conditions as well as  
17 development conditions, described in Section 16.1, “Affected Environment,”  
18 would remain unchanged. No impact on population, demographics, or housing  
19 would occur.

20 In addition, the local government and finance conditions, described in Section  
21 16.1, would continue because no new facilities would be constructed and no  
22 existing facilities would be altered, expanded, or demolished. The positive fiscal  
23 effects associated with the increase in sales and income tax revenue resulting  
24 from project construction-related spending would not occur. Therefore, the No-  
25 Action Alternative would have no impact on government and finance.

26 The impacts of the No-Action Alternative on employment and the labor force  
27 and on business and industrial activity in the lower Sacramento River and Delta  
28 area are described below.

29 *Impact Socio-1 (No-Action): Potential for Reduced Employment Opportunities*  
30 *for Lower Sacramento River and Delta Area Residents* The No-Action  
31 Alternative has the potential to result in periodic water and power supply  
32 disruptions from increasing demand on the existing supply caused by population  
33 growth. These disruptions could result in adverse economic effects on the lower  
34 Sacramento River and Delta portion of the extended study area. This impact  
35 would be potentially significant.

36 Under the No-Action Alternative, the risk of CVP and SWP water supply  
37 disruptions as well as Western Area Power Administration and DWR power  
38 supply disruptions in the lower Sacramento River and Delta area would be  
39 higher than the risk of such disruptions in the long term under each of the five  
40 action alternatives. Although the likelihood of such disruptions is difficult to

1 predict, the CalSim-II (SLWRI 2012 Benchmark Version) modeling performed  
2 to simulate future water and power supply conditions under 2030 No-Action  
3 Alternative conditions, and 2030 conditions under each of the action  
4 alternatives, indicates that all five action alternatives would enhance CVP and  
5 SWP water and power supply conditions relative to 2030 No-Action Alternative  
6 conditions. (CalSim-II modeling of power supply conditions for the 2030 No-  
7 Action Alternative currently is not available.)

8 An increase in the risk of water and power supply disruptions could, in turn,  
9 increase the likelihood that temporary and adverse socioeconomic effects would  
10 take place during related reductions in economic activity, including reductions  
11 in employment opportunities. Adverse economic effects during times of  
12 drought, blackouts, or other types of water or power supply disruptions also  
13 could include delays in hiring employees or layoffs, if businesses experience  
14 water and/or power rate increases as a result of water and power purveyors  
15 seeking other, more expensive replacement sources. This impact would be  
16 potentially significant. Mitigation is not required for the No-Action Alternative.

17 *Impact Socio-2 (No-Action): Potential for Temporary Disruptions in Business*  
18 *and Industrial Activity in the Lower Sacramento River and Delta Area* If water  
19 or power supply disruptions were to occur, they could cause temporary  
20 reductions in business and industrial activity, especially where water- and  
21 power-intensive industries and businesses are found. This impact would be  
22 potentially significant.

23 As discussed under Impact Socio-1 (No-Action) above, an increase in the risk  
24 of water or power supply disruptions could occur in the lower Sacramento River  
25 and Delta portion of the extended study area under the No-Action Alternative.  
26 If such disruptions were to occur, they could cause temporary reductions in  
27 business and industrial activity, especially in areas where water- and power-  
28 intensive industries and businesses are found. Because the No-Action  
29 Alternative could have adverse effects on businesses and industrial activity in  
30 the case of drought, blackouts, or other types of water or power supply  
31 disruptions, this impact would be potentially significant. Mitigation is not  
32 required for the No-Action Alternative.

33 **CVP/SWP Service Areas** Under the No-Action Alternative, the projected  
34 population, demographic, and housing conditions as well as development  
35 conditions, described in Section 16.1, “Affected Environment,” would remain  
36 unchanged. No impact would occur. Therefore, potential effects of the No-  
37 Action Alternative on population, demographics, or housing in this geographic  
38 region are not discussed further.

39 In addition, the local government and finance conditions in the CVP and SWP  
40 service areas described in Section 16.1 would continue. The positive fiscal  
41 effects associated with the increase in sales and income tax revenue resulting  
42 from construction-related spending would not occur. Therefore, no impact

1 would occur under the No-Action Alternative. Potential effects of this  
2 alternative on government and finance in this geographic region are not  
3 discussed further.

4 The impacts of the No-Action Alternative on employment and the labor force  
5 and on business and industrial activity in the CVP and SWP service areas are  
6 described below.

7 *Impact Socio-3 (No-Action): Potential for Reduced Employment Opportunities*  
8 *for Residents within the CVP and SWP Service Areas* The No-Action  
9 Alternative has the potential to result in periodic water and power supply  
10 disruptions from increasing demand on the existing supply, caused by  
11 population growth. These disruptions could result in variability in economic  
12 activity, which could reduce or delay employment opportunities in the CVP and  
13 SWP service areas. This impact would be potentially significant.

14 Under the No-Action Alternative, the risk of CVP and SWP water supply  
15 disruptions as well as Western Area Power Administration and DWR power  
16 supply disruptions would be higher than the risk of such disruptions in the long  
17 term under each of the five action alternatives. The likelihood of such  
18 disruptions is difficult to predict; however, the CalSim-II modeling performed  
19 to simulate future water and power supply conditions under 2030 No-Action  
20 Alternative conditions, and 2030 conditions under each of the action  
21 alternatives, indicates that all five action alternatives would enhance CVP and  
22 SWP water and power supply conditions relative to 2030 No-Action Alternative  
23 conditions. (CalSim-II modeling of power supply conditions for the 2030 No-  
24 Action Alternative currently is not available.)

25 An increase in the risk of water and power supply disruptions, including  
26 drought, blackouts, or other types of water or power disruptions, could in turn  
27 increase the likelihood of temporary and adverse socioeconomic effects.  
28 Adverse economic effects during times of these disruptions could reduce  
29 economic activity and also result in delays in hiring employees or layoffs if  
30 businesses were to experience water and/or power rate increases as a result of  
31 water and power purveyors seeking other, more expensive replacement sources.  
32 This impact would be potentially significant. Mitigation is not required for the  
33 No-Action Alternative.

34 *Impact Socio-4 (No-Action): Potential for Temporary Disruptions in Business*  
35 *and Industrial Activity in the CVP and SWP Service Areas* If water or power  
36 supply disruptions were to occur, they could cause temporary reductions in  
37 business and industrial activity, especially where water- and power-intensive  
38 industries and businesses are found. This impact would be potentially  
39 significant.

40 As discussed under Impact Socio-3 (No-Action) above, an increase in the risk  
41 of water or power supply disruptions could occur in the CVP and SWP service

1 areas under the No-Action Alternative. If such disruptions were to occur, they  
2 could cause temporary reductions in some business and industrial activity,  
3 especially in areas where water- and power-intensive industries and businesses  
4 are found. Because the No-Action Alternative could have adverse effects on  
5 businesses and industrial activity in the case of drought, blackouts, or other  
6 types of water or power supply disruptions, this impact would be potentially  
7 significant. Mitigation is not required for the No-Action Alternative.

8 **CP1 – 6.5-Foot Dam Raise, Anadromous Fish Survival and Water Supply**  
9 **Reliability**

10 CP1 focuses on increasing water supply reliability and increasing anadromous  
11 fish survival. This plan primarily consists of raising Shasta Dam by 6.5 feet,  
12 which, in combination with spillway modifications, would increase the height of  
13 the reservoir's full pool by 8.5 feet and enlarge the total storage capacity in the  
14 reservoir by 256,000 acre-feet to 4.81 million-acre feet (MAF). CP1 would  
15 increase would increase the maximum surface area of the pool to 30,800 acres.  
16 Shasta Dam operational guidelines would continue essentially unchanged,  
17 except during dry years and critical years, when 70 thousand acre-feet (TAF)  
18 and 35 TAF, respectively, of the increased storage capacity in Shasta Reservoir  
19 would be reserved to specifically focus on increasing municipal and industrial  
20 (M&I) deliveries.

21 Implementing CP1 is expected to result in the replacement or modification of  
22 8 bridges and relocation of approximately 45 existing structures. The total  
23 construction cost associated with CP1 would be approximately \$891 million.

24 CP1 would help reduce estimated future agricultural and M&I water shortages  
25 and would increase water supply reliability in the CVP/SWP service areas by  
26 increasing firm yield for agricultural and M&I deliveries, by at least 47,300  
27 acre-feet per year in dry and critical years, and increasing average annual yield  
28 by about 31,000 acre-feet per year. The majority of the firm yield (i.e., 42,700  
29 acre-feet) would be for south-of-Delta agricultural and M&I deliveries. In  
30 addition, CP1 would provide hydropower benefits by increasing hydropower  
31 generation, by approximately 54 gigawatt-hours (GWh) per year. In addition,  
32 the increased depth and volume of the cold-water pool in Shasta Reservoir  
33 would contribute to improving seasonal water temperatures for anadromous fish  
34 in the upper Sacramento River.

35 **Shasta Lake and Vicinity and Upper Sacramento River (Shasta Dam to**  
36 **Red Bluff)**

37 *Impact Socio-1 (CP1): Short-Term Increase in Population and Housing*  
38 *Demand in the Primary Study Area Resulting from Construction-Related*  
39 *Activities* According to Reclamation estimates, approximately 300 direct jobs  
40 would be created as a result of construction activities associated with CP1. All  
41 300 construction workers are expected to come from the local labor force;  
42 therefore, a temporary population increase is not expected. This impact would  
43 be less than significant.

1 Approximately 300 construction workers would be needed over the 4.5-year  
2 construction period to support the construction activities related to the 6.5-foot  
3 raise of Shasta Dam. Because of the availability, experience, and expertise of  
4 the existing labor force within the primary study area, the necessary workers are  
5 expected to be available in the surrounding two counties (Shasta and Tehama  
6 counties). Therefore, no construction workers are expected to be sourced from  
7 outside the primary study area, and no employees (or very few) would need to  
8 relocate to the project area during the construction period. Even if a relatively  
9 small number of workers were to come from outside the local area, sufficient  
10 housing capacity (e.g., rental housing, motel, and apartment vacancies) exists in  
11 the area. Thus, effects on population and housing in the primary and extended  
12 study areas are not expected; if they were to occur, they would be very minor.  
13 This impact would be less than significant. Mitigation for this impact is not  
14 needed, and thus not proposed.

15 *Impact Socio-2 (CP1): Short-Term Increases in Direct, Indirect, and Induced*  
16 *Employment in the Primary Study Area Related to Construction Activities*

17 Construction activities associated with CP1 would generate approximately 300  
18 construction jobs, 390 indirect jobs in various construction-related support  
19 industries, and 600 induced jobs because of increased household spending in the  
20 primary study area. Individuals to fill these jobs are expected to be drawn from  
21 the local community. These new jobs are expected to provide important but  
22 temporary employment opportunities to many unemployed construction  
23 workers in the primary study area. This impact would be beneficial.

24 Concrete workers, workers with large-scale construction experience, general  
25 laborers, and others would be drawn from the existing local construction  
26 industry. These jobs would represent a relatively small increase (less than  
27 0.3 percent) in the total labor force in the two counties (109,960 employees) of  
28 the primary study area, but would represent a substantial increase in  
29 employment for many of the cities surrounding the project site, where  
30 employment has consistently been below countywide and statewide averages  
31 (EDD 2010a, 2010b).

32 Although the increase in employment would represent a small percentage  
33 increase for the two-county area, the employment opportunities created by CP1  
34 would represent a substantial contribution in counties that have consistently  
35 registered high unemployment rates. Unemployment rates steadily increased in  
36 both Shasta and Tehama counties, from around 7 percent in 2007 to over 15  
37 percent in 2010 (EDD 2010a). Similarly, unemployment rates in the cities of  
38 Anderson, Shasta Lake, and Red Bluff steadily increased between 2007 and  
39 2010, with Anderson and Shasta Lake exceeding those recorded at both county  
40 levels (EDD 2010b). Within Trinity and Siskiyou counties (i.e., the remaining  
41 two counties in the local economic study area, the area used in IMPLAN  
42 modeling), the 2010 unemployment rates exceeded 16 percent and 18 percent,  
43 respectively (EDD 2010c).

1 As stated above, IMPLAN modeling calculates “direct” employment generated  
2 by individual alternatives as well as “indirect and induced” positions that are  
3 created by construction-related and operational activities. Indirect employment  
4 may be to support hiring in businesses that provide materials to the construction  
5 effort; in service-related industries that provide food, beverages, and other  
6 goods to construction workers; or in more technical industries, such as  
7 consulting firms and other businesses. Induced employment is jobs that are  
8 created in the region because of increased household spending and not limited  
9 to construction-related activities.

10 In addition to the 300 direct, construction-related jobs to be created from CP1,  
11 an additional 390 indirect jobs are expected to be created from construction  
12 support industries, and 600 induced jobs from increased household spending  
13 near the project area. The generation of 1,290 new positions (direct, indirect,  
14 and induced) would represent a 1.0 percent increase from the total 2010 labor  
15 force of the four counties in the local economic study area used in the IMPLAN  
16 modeling (Shasta, Tehama, Trinity, and Siskiyou counties), which totaled  
17 approximately 135,100 employees (EDD 2010c). A 1.0 percent increase in  
18 employment would represent a substantial increase in total employment,  
19 especially for an area experiencing recent unemployment rates like those  
20 observed in the primary study area.

21 Because CP1 would create direct, indirect, and induced jobs in an area with  
22 high unemployment rates, this impact would be beneficial. Mitigation for this  
23 impact is not needed, and thus not proposed.

24 *Impact Socio-3 (CP1): Potential for Temporary Reduction in the Labor Force*  
25 *of Related Industrial Sectors in the Primary Study Area as a Result of Direct*  
26 *Construction-Related Employment* With the creation of 300 construction jobs  
27 resulting from CP1, the potential would exist for workers from other industries  
28 to move to jobs related to construction at Shasta Dam. Because of the size of the  
29 construction industry in the primary study area, and the high unemployment rate  
30 in the area, this impact would be less than significant.

31 As the 300 positions created under CP1 are filled, the potential would exist for  
32 the positions to be filled by individuals currently working in related industries  
33 within the local community. This transfer of workers from related industries to  
34 the Shasta project could create a labor shortage in the related industry, if  
35 particularly skilled workers are required. In 2010, Shasta County registered  
36 4,700 employees in the construction industry, while construction industry  
37 workers in Tehama County equaled only 1,600 individuals, for a total of 6,300  
38 construction workers in the area (U.S. Census Bureau 2011a). Based on total  
39 employment levels and current unemployment trends in the primary study area,  
40 the 300 new construction-related jobs are not expected to substantially affect the  
41 local labor force. If a high number of workers were to be sourced from Tehama  
42 County, a limited effect could be observed because of the small number of  
43 workers in the construction industry in that county. Overall, however, this

1 impact would be less than significant. Mitigation for this impact is not needed,  
2 and thus not proposed.

3 *Impact Socio-4 (CP1): Short-Term Increases in Direct, Indirect, and Induced*  
4 *Personal Income Paid to Employees in the Primary Study Area Hired for*  
5 *Construction-Related Activities* Based on calculations completed as a part of  
6 Reclamation's IMPLAN socioeconomic model process, more than  
7 \$80.8 million in personal income is expected to be directly paid to employees in  
8 the primary study area each year of construction under CP1. In addition, more  
9 than \$45.4 million in personal income is expected to be generated from various  
10 indirect and induced construction-related and other industries in the primary  
11 study area each year of construction under CP1. The combined \$126.2 million  
12 in personal income to be generated would represent an approximately  
13 92.3 percent increase in all annual personal income in the local economic study  
14 area. This impact would be beneficial.

15 Based on the results of modeling that was performed using Reclamation's  
16 IMPLAN model, an estimated \$80.8 million would be directly paid each year to  
17 the approximately 300 construction workers required to complete work for  
18 CP1 during the proposed 4.5-year construction period. The positions expected  
19 from implementation of project construction are anticipated to be union  
20 positions, and workers would be paid according to union wage and benefit  
21 standards.

22 Based on the generation of 990 indirect and induced jobs resulting from  
23 implementation of CP1, \$45.4 million in personal income is expected to be  
24 available for residents of the local economic study area each year during the  
25 proposed 4.5-year construction period. This personal income would be  
26 generated in industries that would support the construction efforts at Shasta  
27 Dam.

28 Personal income in the four counties of the local economic study area has  
29 substantially decreased, from \$8.9 billion in 2007 to \$9.8 million in 2010 (EDD  
30 2010d). Most of this decline can be attributed to high unemployment rates and  
31 other recessionary factors. With more than \$6.2 million in personal income in  
32 2010, Shasta County contributed more than 60 percent of personal income in  
33 the four counties.

34 The combined direct, indirect, and induced personal income resulting from CP1  
35 is expected to exceed \$126.2 million per year of construction activities within  
36 the local economic study area. This increase in personal income would represent  
37 an approximately 92.2 percent increase in all annual personal income in the  
38 local economic study area. This impact would be beneficial. Mitigation for this  
39 impact is not needed, and thus not proposed.

40 *Impact Socio-5 (CP1): Short-Term Increases in Sales and Profits for Businesses*  
41 *in the Primary Study Area that Support the Construction Industry* Most of the

1 construction materials used for CP1 are expected to be purchased within the  
2 primary study area. These purchases would provide the local economy with  
3 increased sales and profits over the 4.5-year construction period. This impact  
4 would be beneficial.

5 A large amount of construction material would be needed to raise Shasta Dam  
6 by 6.5 feet, as prescribed in CP1. These purchases may include raw or refined  
7 materials, infrastructure-related products, and/or equipment required for the  
8 construction process. Most of this material likely would be sourced from  
9 businesses within the primary study area. As a result of the large quantity of  
10 purchases expected, local businesses would experience temporary increases in  
11 sales and profits over the 4.5-year construction period. During the construction  
12 period, implementation of CP1 is expected to generate more than \$319.7 million  
13 per year in sales and profits for construction-related and service-oriented  
14 businesses that support the construction industry, with approximately \$198.1  
15 million in direct income and \$121.6 in indirect and induced income. Increased  
16 sales and profits could be reinvested into existing businesses, invested in new  
17 ventures or diversification, translated into increased salaries and wages for  
18 employees, or used in other ways. Therefore, this impact would be beneficial.  
19 Mitigation for this impact is not needed, and thus not proposed.

20 *Impact Socio-6 (CP1): Short-Term Increase in State and Local Sales Tax*  
21 *Revenues in the Primary Study Area from Construction-Related Personal*  
22 *Income and Purchases* As stated above, implementation of CP1 is expected to  
23 result in a substantial increase in total personal income (direct, indirect, and  
24 induced) during the construction period. This additional income, in combination  
25 with the construction-related purchases in the primary study area, would result  
26 in a substantial increase in local sales tax revenues from increased consumer  
27 spending in nearby cities and counties. Construction-related activities under  
28 CP1 likely also would result in a temporary increase in State sales and income  
29 tax revenues received from businesses and residents of the primary study area.  
30 The exact amount of State and local sales tax revenue increases would be  
31 speculative; however, this impact would be beneficial.

32 Based on the results of modeling performed using Reclamation's IMPLAN  
33 model, implementation of CP1 is expected to generate more than \$568.0 million  
34 in total personal income, with approximately \$363.6 million in direct income  
35 and \$204.4 million in indirect and induced income during the proposed 4.5-year  
36 construction period (see Socio-4 (CP1), above). In addition to this increase in  
37 personal income, most of the construction materials would be purchased within  
38 the primary study area, generating a substantial amount of revenue and profits  
39 for local businesses (see Impact Socio-5 (CP1), above).

40 In combination, increased personal income and construction-related spending  
41 are expected to substantially increase the total sales tax revenues of local  
42 jurisdictions within the primary study area. Larger amounts of local sales tax  
43 revenue then could be used to establish new programs and initiatives or bolster



1 existing ones through additional funding. New and improved programs and  
2 initiatives would provide benefits to local residents.

3 As a result of the increased employment and personal income anticipated from  
4 implementation of CP1, a temporary increase in State sales and income tax  
5 would be likely to occur. During the construction period, more than \$568.0  
6 million in personal income is expected to be generated by direct, indirect, and  
7 induced employment, produced by the project. The increase in personal income  
8 would increase spending at local businesses within the primary study area. The  
9 exact amount of State and local sales tax revenue increases would be  
10 speculative; however, this additional spending would result in sizeable State  
11 sales tax revenues. This increased revenue source would be likely to return to  
12 the primary study area via statewide programs and policies.

13 For the reasons described above, this impact would be beneficial. Mitigation for  
14 this impact is not needed, and thus not proposed.

15 *Impact Socio-7 (CP1): Long-Term Reduction in the Adverse Economic Effects*  
16 *of Flooding in the Primary Study Area* As a result of the added reservoir  
17 capacity created by CP1, the overall risk of flooding below Shasta Dam and its  
18 related consequences to the primary study area are expected to be reduced.  
19 Although heavy rain events would continue to occur in the region and locally,  
20 the project is intended to provide greater flexibility in flood control downstream  
21 because of the increased capacity of the reservoir. As a result, less damage to  
22 existing structures and a smaller loss of potential future development would  
23 occur; this, in turn, would reduce salary and wage losses for residents of the  
24 primary study area, as well as business and personal income losses from such  
25 damage. Therefore, this impact would be beneficial.

26 In Reclamation's Initial Alternatives Information Report (2004), flood control  
27 was identified as a secondary objective of the project. Increased flood control is  
28 to be emphasized when the two primary objectives of the project, increased  
29 anadromous fish survival and increased water supply reliability, can be met.  
30 Periodic flood events in the Sacramento Valley frequently cause substantial  
31 damage to properties adjacent to the valley's many waterways. Currently,  
32 Shasta Dam provides substantial protection from such flooding damage for  
33 downstream residents.

34 CP1 would increase the storage capacity of Shasta Lake by 256,000 acre-feet.  
35 This added capacity would provide greater flexibility in Reclamation's ability to  
36 use the reservoir for flood control purposes, thereby increasing the threshold at  
37 which seasonal heavy rain events produce flood conditions downstream from  
38 the dam. The benefits of this increase in capacity and related flood control  
39 options would be most evident along the upper Sacramento River within the  
40 primary study area. Structures and inhabitants in this floodplain experience the  
41 most direct effects from storage releases during flood events. CP1 would reduce

1 the frequency, magnitude, and duration of future flood events that have affected  
2 structures and their residents in this part of the primary study area in the past.

3 The loss of jobs and adverse effects on economic well-being and livelihoods is  
4 an often overlooked consequence of catastrophic flood events. Avoiding a  
5 larger number of these events, and possibly decreasing the magnitude and  
6 duration of flooding under certain high-flow events, is expected to reduce the  
7 overall economic hardships faced by residents of the primary study area under  
8 CP1.

9 Structures and businesses located on the river and inhabitants of the floodplain  
10 experience the most direct effects from flood releases downstream. However,  
11 flood events also could affect those not living on the river or in the floodplain  
12 but working downstream from the dam at businesses subject to flood damage.  
13 The reduced risk of flood events associated with CP1 also is expected to reduce  
14 the business and personal income losses resulting from substantial damage to  
15 structures and businesses located adjacent to downstream waterways in the  
16 primary study area.

17 Implementation of CP1 would reduce damage to structures, loss of business and  
18 personal income, loss of jobs, and other adverse effects on economic well-being  
19 in the primary study area. Therefore, this impact would be beneficial. Mitigation  
20 for this impact is not needed, and thus not proposed.

21 *Impact Socio-8 (CP1): Long-Term Increases in Direct Employment in the*  
22 *Primary Study Area Related to Project Operations* In the long term,  
23 implementation of CP1 is expected to create at least two new maintenance-  
24 related positions at the Shasta Dam facilities. These two positions are expected  
25 to be permanent and would continue once the 4.5-year construction period is  
26 completed. This impact would be minor but beneficial.

27 Reclamation estimates that with the 6.5-foot increase of Shasta Dam proposed  
28 in CP1, at least two new permanent maintenance positions would be required to  
29 ensure efficient operation of dam facilities. These two positions are expected to  
30 be union positions, and consequently would provide union-level wages and  
31 benefits. Both positions would be filled after completion of the construction  
32 activities associated with CP1 and would continue for the foreseeable future.  
33 This impact, though small, would be beneficial. Mitigation for this impact is not  
34 needed, and thus not proposed.

### 35 **Lower Sacramento River and Delta**

36 *Impact Socio-9 (CP1): Potential Temporary Increase in Indirect Employment in*  
37 *Construction-Related Businesses of the Lower Sacramento River and Delta*  
38 Construction activities associated with CP1 have the potential to result in a  
39 temporary increase in indirect employment within the lower Sacramento River  
40 and Delta portion of the extended study area. Depending on the location of  
41 construction materials sourced outside of the primary study area, indirect

1 increases in employment within construction-related businesses may result in  
2 the lower Sacramento River and Delta area. This impact would be minor but  
3 beneficial.

4 As a result of construction activities that would be completed during  
5 implementation of CP1, temporary increases in indirect employment would be  
6 expected in the lower Sacramento River and Delta portion of the extended study  
7 area. A small amount of the construction materials necessary for CP1 would be  
8 obtained outside the primary study area. During the construction period,  
9 businesses that provide construction materials are expected to increase  
10 employment to meet project demand. This impact would be beneficial.  
11 Mitigation for this impact is not needed, and thus not proposed.

12 *Impact Socio-10 (CP1): Short-Term Increases in Sales and Profits for*  
13 *Businesses in the Lower Sacramento River and Delta Area that Support the*  
14 *Construction Industry* A small amount of the construction materials used for  
15 CP1 would be purchased within the extended study area. These purchases are  
16 predicted to increase sales and profits of businesses within the lower  
17 Sacramento River and Delta area during the construction period. This impact  
18 would be beneficial.

19 A significant amount of construction materials would be needed to raise Shasta  
20 Dam by 6.5 feet, as prescribed in CP1. Of these materials, a small amount  
21 would be purchased from construction-related businesses in the extended study  
22 area, including the lower Sacramento River and Delta area. These purchases  
23 may include raw or refined materials, infrastructure-related products, and/or  
24 equipment required for the construction process. As a result of the purchases  
25 expected, businesses in the lower Sacramento River and Delta portion of the  
26 extended study area are expected to experience a temporary increase in sales  
27 and profits during the construction period. Similar to businesses within the  
28 primary study area, increased sales and profits could be reinvested into the  
29 existing businesses, invested in new ventures or diversification, translated into  
30 increased salaries and wages for employees, or used in other ways. The exact  
31 scale of the increase in business sales and profits within the lower Sacramento  
32 River and Delta area would be speculative, but this amount likely would be  
33 substantial. Therefore, this impact would be beneficial. Mitigation for this  
34 impact is not needed, and thus not proposed.

35 *Impact Socio-11 (CP1): Short-Term Increase in State Sales and Income Tax*  
36 *Revenues in the Lower Sacramento River and Delta Area from Construction-*  
37 *Related Personal Income and Purchases* In addition to local tax revenues, CP1  
38 is expected to increase short-term, construction-related State sales and income  
39 tax revenues received from businesses and residents of the lower Sacramento  
40 River and Delta portion of the extended study area. These additional revenues  
41 are expected to be cycled back to local government coffers through statewide  
42 programs and policies. This impact would be minor but beneficial.

1 As a result of the increased employment and personal income anticipated as a  
2 part of implementation of CP1, a short-term increase in State sales and income  
3 tax revenues also is expected to occur. In the construction period, more than  
4 \$568.0 million in personal income would be generated by direct, indirect, and  
5 induced employment, generated by the project. This large amount of income  
6 would direct substantial income tax revenues to the State via State income tax  
7 requirements. These additional revenues would contribute substantially to the  
8 State budget and would be distributed to jurisdictions within the lower  
9 Sacramento River and Delta portion of the extended study area via statewide  
10 programs and policies. This impact would be minor but beneficial. Mitigation  
11 for this impact is not needed, and thus not proposed.

12 *Impact Socio-12 (CP1): Long-Term Reduction in the Adverse Economic Effects*  
13 *of Flooding in the Lower Sacramento River and Delta Area* As a result of the  
14 added reservoir capacity under CP1, the overall risk of flooding and its related  
15 consequences below Shasta Dam is expected to be reduced. Although heavy  
16 rain events would continue to occur in the region, CP1 is intended to provide  
17 greater flexibility in flood control in the lower Sacramento River and Delta area  
18 because of the increased capacity of the reservoir. As a result, less damage to  
19 existing structures and a smaller loss of potential future development would be  
20 expected; this, in turn, would reduce salary and wage losses for residents in and  
21 near the lower Sacramento River floodplain and the Delta resulting from these  
22 catastrophic events, as well as business and personal income losses from such  
23 damage. Therefore, this impact would be beneficial.

24 Residents of the lower Sacramento River and Delta portion of the extended  
25 study area would benefit from the additional flexibility and flood control  
26 operations during flood events that would occur as a result of CP1. With the  
27 additional capacity provided by this alternative, the effects of large rain events  
28 would be reduced as a result of the improved management of systemwide flood  
29 control operations. Hydroelectric facilities within the lower Sacramento River  
30 and Delta area would be likely to experience flood events of somewhat less  
31 duration and magnitude, thus reducing the potential effects on vulnerable  
32 houses and property within the floodplain.

33 The loss of jobs and adverse effects on economic well-being and livelihoods  
34 often is an overlooked consequence of catastrophic flood events. Avoiding a  
35 larger number of these events and possibly decreasing the magnitude and  
36 duration of floods under certain high-flow events are expected to reduce the  
37 overall economic hardships faced by residents of the lower Sacramento River  
38 and Delta areas. The effects of heavy rain events would be better managed and  
39 the risk of flood-related effects could be reduced as far downstream as  
40 Sacramento.

41 In addition, fewer flooding events would result in less damage to businesses  
42 located adjacent to waterways during some flood events. This reduction in  
43 damage would reduce the amount of time employees would be without pay

1 because of flood conditions and damage. This reduction in flood damage would  
2 reduce residents' salary and wage losses from these catastrophic events.

3 Implementation of CP1 would reduce damage to structures, loss of business and  
4 personal income, loss of jobs, and other adverse effects on economic well-being  
5 in the lower Sacramento River and Delta areas. Therefore, this impact would be  
6 beneficial. Mitigation for this impact is not needed, and thus not proposed.

7 **CVP/SWP Service Areas**

8 *Impact Socio-13 (CP1): Short-Term Increases in Sales and Profits for*  
9 *Businesses in the CVP and SWP Service Areas that Support the Construction*  
10 *Industry* A small amount of the construction materials used during  
11 construction under CP1 would be purchased within the extended study area,  
12 including the CVP and SWP service areas. These purchases would result in a  
13 minor increase in sales and profits for a few businesses within the CVP and  
14 SWP service areas during the construction period of CP1. This impact would be  
15 minor but beneficial.

16 A small amount of the construction materials used during construction under  
17 CP1 is expected to be purchased from some construction-related businesses in  
18 the extended study area, including the CVP and SWP service areas. These  
19 purchases may include raw or refined materials, infrastructure-related products,  
20 and/or equipment required for the construction process. As a result of the  
21 purchases expected, a few businesses in the CVP and SWP service areas are  
22 expected to experience a short-term increase in sales and profits over the  
23 construction period. The exact scale of the increase in business sales and profits  
24 within the CVP and SWP service areas would be speculative, but would be  
25 minor given the large geographic area of the service areas. Therefore, this  
26 impact would be minor but beneficial. Mitigation for this impact is not needed,  
27 and thus not proposed.

28 *Impact Socio-14 (CP1): Potential Temporary Reduction in Shasta Project*  
29 *Water or Hydropower Supplied to the CVP and SWP Service Areas during*  
30 *Construction* Implementation of CP1 may require temporarily reducing the  
31 reservoir level at critical times during the construction period. This reduction in  
32 the reservoir level could temporarily reduce the amount of water or hydropower  
33 available from the dam and related hydropower infrastructure. Should this  
34 occur, sources of replacement water or hydropower would need to be secured. If  
35 these replacement resources were substantially more expensive, a minor  
36 negative effect on water or power customers may result. This impact would be  
37 potentially significant.

38 Construction activities implemented as part of CP1 would require adding large  
39 quantities of concrete to Shasta Dam. To complete this effort, it may be  
40 necessary to reduce the reservoir's water table to accommodate construction. A  
41 reduced water table may be needed at critical points in the construction process.  
42 Regardless of the approach needed, a reduced water table would limit the

1 amount of water and/or hydropower that would be available from the dam for  
2 use in the CVP and SWP service areas. As a result, periods could occur in  
3 which water or hydropower availability within the CVP and SWP service areas  
4 may be more limited, especially during dry periods.

5 To address potential temporary shortages in water or hydropower caused by  
6 reduced availability at Shasta Dam, replacement water or hydropower supplies  
7 would need to be sourced elsewhere to maintain existing service needs.  
8 Depending on the conditions of the water or energy markets at the time of need,  
9 these replacement resources could be more expensive than water or hydropower  
10 obtained from Shasta Dam. The additional expense of obtaining water or  
11 hydropower resources could produce a minor negative effect on water and  
12 power customers if replacing these resources would be substantially more  
13 expensive. This impact would be potentially significant. Mitigation for this  
14 impact is proposed in Section 16.3.5.

15 *Impact Socio-15 (CP1): Short-Term Increase in State Sales and Income Tax*  
16 *Revenues in the CVP and SWP Service Areas from Construction-Related*  
17 *Personal Income and Purchases* CP1 is expected to increase short-term,  
18 construction-related, State sales and income tax revenues received from  
19 businesses and residents of the CVP and SWP service areas. These additional  
20 revenues are expected to be cycled back to local government coffers through  
21 statewide programs and policies. This impact would be beneficial.

22 As a result of the increased employment and personal income anticipated as a  
23 part of implementation of CP1, a short-term increase in State sales and income  
24 tax revenues would be likely to occur. During the construction period for CP1,  
25 more than \$568.0 million in personal income would be generated by direct,  
26 indirect, and induced employment produced by the project. This large amount  
27 of income would direct substantial income tax revenues to the State, to meet  
28 State income tax requirements. These additional revenues would contribute  
29 substantially to the State budget and would be distributed to jurisdictions within  
30 the CVP and SWP service areas via statewide programs and policies. This  
31 impact would be beneficial. Mitigation for this impact is not needed, and thus  
32 not proposed.

33 *Impact Socio-16 (CP1): Long-Term Increase in Agricultural Income and Jobs*  
34 *in the CVP and SWP Service Areas as a Result of Improved Water Availability*  
35 *and Reliability* Based on SWAP modeling, improved water availability and  
36 reliability expected to result from implementation of CP1 would substantially  
37 increase agricultural net income in the CVP and SWP service areas and would  
38 increase the number of agricultural positions in these areas. This increase in  
39 production and jobs would contribute substantially to the continuation of this  
40 already strong industry in California. This impact would be beneficial.

41 Among CVP and SWP's water consumers, agricultural users benefit the most  
42 from increased water availability and reliability because of more consistent

1 irrigation opportunities throughout the year. Based on the outputs of SWAP  
2 modeling, CP1 would improve long-term water availability and reliability  
3 within the CVP and SWP service areas by adding to water storage capacity.  
4 Long-term improvements to the availability and reliability of water are expected  
5 to allow farmers within the CVP and SWP service areas to substantially  
6 increase agricultural production, especially in dry years. It was estimated that  
7 CP1 would increase the net agricultural income within the 27 SWAP regions by  
8 more than \$1.27 million in an average year and up to \$1.50 million during dry  
9 years. In wet years, net income is projected to increase to \$1.89 million.

10 To support the increased agricultural production expected during the  
11 implementation of CP1, more agricultural workers would be needed. SWAP  
12 does not estimate the number of additional agricultural positions that would be  
13 created as a result of improved irrigation, but the resulting increase in water  
14 reliability and availability would have the potential to strengthen and extend the  
15 existing growing season in the CVP and SWP service areas. This would enable  
16 existing employees to work for longer periods in the fields and also would  
17 increase the number of workers needed during the growing season. These  
18 additional agricultural workers are expected to be distributed across the CVP  
19 and SWP service areas. This impact would be beneficial. Mitigation for this  
20 impact is not needed, and thus not proposed.

21 *Impact Socio-17 (CP1): Reduction in Risk of Potential Water and Power*  
22 *Shortages (and Related Economic Activity) in the CVP and SWP Service Areas*  
23 *as a Result of Long-Term Improvements to Water and Power Supply Reliability*  
24 Implementation of CP1 would substantially increase Shasta Dam's storage  
25 capacity. As stated in Impact Socio-16 (CP1), this additional storage capacity  
26 would improve the long-term availability and reliability of water in the CVP  
27 and SWP service areas. Beyond increasing agricultural production, this  
28 improved availability and reliability would reduce the long-term risk of urban  
29 water and power shortages, and their related adverse economic consequences.  
30 This impact would be beneficial.

31 In addition to improving agricultural production, implementation of CP1 would  
32 increase water availability and reliability for industrial and urban users within  
33 the CVP and SWP service areas. For these users, the additional 265,000 acre-  
34 feet of storage capacity proposed by CP1 is expected to substantially reduce the  
35 long-term risk of water and power shortages from periodic flow constraints. As  
36 a result, water and power users would be likely to experience fewer water and  
37 power shortages caused by reduced reservoir levels, such as those experienced  
38 in dry years. This reduction in water and power shortages, along with avoidance  
39 of the related loss of economic production, would represent a substantial benefit  
40 for users in the CVP and SWP service areas. This benefit would be most  
41 pronounced for water- and power-intensive industries that are heavily  
42 dependent on consistent water and power availability. This impact would be  
43 beneficial. Mitigation for this impact is not needed, and thus not proposed.

1                   **CP2 – 12.5-Foot Dam Raise, Anadromous Fish Survival and Water Supply**  
2                   **Reliability**

3                   As with CP1, CP2 focuses on increasing water supply reliability and increasing  
4                   anadromous fish survival. CP2 primarily consists of raising Shasta Dam by 12.5  
5                   feet, which, in combination with spillway modifications, would increase the  
6                   height of the reservoir’s full pool by 14.5 feet and enlarge the total storage  
7                   capacity in the reservoir by 443,000 acre-feet to 5.0 MAF. CP2 would increase  
8                   the maximum surface area of the pool of the reservoir to 31,600 acres. Shasta  
9                   Dam operational guidelines would continue essentially unchanged, except  
10                  during dry years and critical years, when 120 TAF and 60 TAF, respectively, of  
11                  the increased storage capacity in Shasta Reservoir would be reserved to  
12                  specifically focus on increasing M&I deliveries.

13                  Implementing CP2 would result in the replacement or modification of 8 bridges  
14                  and relocation of approximately 100 existing structures. The total construction  
15                  cost associated with CP2 would be approximately \$984 million.

16                  CP2 would help reduce estimated future agricultural and M&I water shortages  
17                  and would increase water supply reliability in the CVP/SWP service areas, by  
18                  increasing firm yield for agricultural and M&I deliveries by at least 77,800  
19                  acre-feet per year in dry and critical years and increasing average annual yield  
20                  by about 51,300 acre-feet per year. The majority of the firm yield (i.e., 67,100  
21                  acre-feet) would be for south-of-Delta agricultural and M&I deliveries. In  
22                  addition, CP2 would provide hydropower benefits by increasing hydropower  
23                  generation by approximately 90 GWh per year. In addition, the increased depth  
24                  and volume of the cold-water pool in Shasta Reservoir would contribute to  
25                  improving seasonal water temperatures for anadromous fish in the upper  
26                  Sacramento River.

27                  **Shasta Lake and Vicinity and Upper Sacramento River (Shasta Dam to**  
28                  **Red Bluff)**

29                  *Impact Socio-1 (CP2): Short-Term Increase in Population and Housing*  
30                  *Demand in the Primary Study Area Resulting from Construction-Related*  
31                  *Activities* According to Reclamation estimates, approximately 300 new direct  
32                  jobs would be created as a result of construction activities associated with CP2.  
33                  All 300 construction workers are expected to come from the local labor force;  
34                  therefore, a short-term population increase is not expected. This impact would  
35                  be less than significant.

36                  This impact would be similar to Impact Socio-1 (CP1). Approximately 5 years  
37                  of work (compared to the 4.5 years proposed under CP1) would be required to  
38                  complete the construction activities proposed under CP2. As described above  
39                  under Impact Socio-1 (CP1), a short-term population increase is not expected  
40                  with implementation of CP2. This impact would be less than significant.  
41                  Mitigation for this impact is not needed, and thus not proposed.



1                    *Impact Socio-2 (CP2): Short-Term Increases in Direct, Indirect, and Induced*  
2                    *Employment in the Primary Study Area Related to Construction Activities*  
3                    Construction activities associated with CP2 are expected to generate  
4                    approximately 300 new direct construction jobs, 600 indirect jobs in various  
5                    construction-related support industries, and 600 induced jobs because of  
6                    increased household spending in the primary study area. Individuals to fill these  
7                    jobs would be drawn from the local community. These new jobs would provide  
8                    important but temporary employment opportunities to many unemployed  
9                    construction workers in the primary study area. This impact would be  
10                    beneficial.

11                    This impact would be the same as Impact Socio-2 (CP1) and would be  
12                    beneficial. Mitigation for this impact is not needed, and thus not proposed.

13                    *Impact Socio-3 (CP2): Potential for Temporary Reduction in the Labor Force*  
14                    *of Related Industrial Sectors in the Primary Study Area as a Result of Direct*  
15                    *Construction-Related Employment* With the creation of 300 new construction  
16                    jobs resulting from CP2, the potential would exist for workers from other  
17                    industries to move to jobs related to construction at Shasta Dam. Because of the  
18                    size of the construction industry in the primary study area and the high  
19                    unemployment rate in the area, this impact would be less than significant.

20                    This impact would be the same as Impact Socio-3 (CP1) and would be less than  
21                    significant. Mitigation for this impact is not needed, and thus not proposed.

22                    *Impact Socio-4 (CP2): Short-Term Increases in Direct, Indirect, and Induced*  
23                    *Personal Income Paid to Employees in the Primary Study Area Hired for*  
24                    *Construction-Related Activities* Based on calculations completed as a part of  
25                    Reclamation's IMPLAN socioeconomic model process, more than \$80.3  
26                    million in personal income would be directly paid to employees in the primary  
27                    study area each year of the 5-year construction period under CP2. The  
28                    combined \$126.2 million in personal income that would be generated would  
29                    represent an approximately 92.3 percent increase in all annual personal income  
30                    in the local economic study area. In addition, approximately \$45.4 million in  
31                    indirect and induced income is expected to be generated in various construction-  
32                    related and other industries in the primary study area each year of construction  
33                    under CP2. This impact would be beneficial.

34                    This impact would be the same as Impact Socio-4 (CP1) and would be  
35                    beneficial. Mitigation for this impact is not needed, and thus not proposed.

36                    *Impact Socio-5 (CP2): Short-Term Increases in Sales and Profits for Businesses*  
37                    *in the Primary Study Area that Support the Construction Industry* Most of the  
38                    construction materials used for CP2 are expected to be purchased within the  
39                    primary study area. These purchases would provide the local economy with  
40                    increased sales and profits over the 5-year construction period. This impact  
41                    would be beneficial.

1 This impact would be similar to but more beneficial than Impact Socio-5 (CP1).  
2 Because of the longer project duration and larger dam raise proposed under  
3 CP2, short-term increases in sales and profits for businesses that support the  
4 construction industry in the primary study area would be larger than those under  
5 CP1. During the construction period, implementation of CP2 is expected to  
6 generate more than \$317.6 million per year in sales and profits for construction-  
7 related and service-oriented businesses that support the construction industry,  
8 with approximately \$196.8 million in direct income and \$120.8 indirect and  
9 induced income. The direct income would be \$700,000 more than under CP1;  
10 however, the induced income would be \$900,000 less than under CP1. The  
11 additional time and materials required to implement CP2 over 5 years would  
12 generate more in sales and profits than CP1 for construction-related and service-  
13 oriented businesses. This impact would be beneficial. Mitigation for this impact  
14 is not needed, and thus not proposed.

15 *Impact Socio-6 (CP2): Short-Term Increase in State and Local Sales Tax*  
16 *Revenues in the Primary Study Area from Construction-Related Personal*  
17 *Income and Purchases* As stated above, implementation of CP2 is expected to  
18 result in a substantial increase in total personal income (direct, indirect, and  
19 induced) over the 5-year construction period. This additional income, in  
20 combination with construction-related purchases in the primary study area,  
21 would result in a substantial increase in local sales tax revenues from increased  
22 consumer spending in nearby cities and counties. Construction-related activities  
23 under CP2 also would be likely to result in a temporary increase in State sales  
24 and income tax revenues received from businesses and residents of the primary  
25 study area. The exact amount of State and local sales tax revenue increases  
26 would be speculative; however, this impact would be beneficial.

27 This impact would be similar to but would be more beneficial than Impact  
28 Socio-6 (CP1). Because of the larger total personal income (direct, indirect, and  
29 induced) and larger sales and profits for businesses over the construction period  
30 expected to result from implementation of CP2, the short-term increase in local  
31 sales tax revenues generated by CP2 would be greater than that from CP1 (see  
32 Impacts Socio-4 (CP2) and Socio-5 (CP2), above). Construction-related  
33 activities under CP2 also are expected to result in a temporary increase in State  
34 sales and income tax revenues received from businesses and residents of the  
35 primary study area. These additional revenues would likely be cycled back to  
36 local government coffers through statewide programs and policies. The  
37 increases in State sales and income taxes are expected to be larger under CP2  
38 than under CP1. All of these increases would be beneficial for the relevant local  
39 jurisdictions. This impact would be beneficial. Mitigation for this impact is not  
40 needed, and thus not proposed.

41 *Impact Socio-7 (CP2): Long-Term Reduction in the Adverse Economic Effects*  
42 *of Flooding in the Primary Study Area* As a result of the added reservoir  
43 capacity created by CP2, the overall risk of flooding below Shasta Dam and its  
44 related consequences to the primary study area would be reduced. Although

1 heavy rain events would continue to occur in the region and locally, the project  
2 is intended to provide greater flexibility in flood control downstream because of  
3 the increased capacity of the reservoir. As a result, less damage to existing  
4 structures and a smaller loss of potential future development would occur; this,  
5 in turn, would reduce salary and wage losses for residents of the primary study  
6 area, as well as business and personal income losses from such damage.  
7 Therefore, this impact would be beneficial.

8 This impact would be similar to but would be more beneficial than Impact  
9 Socio-7 (CP1). CP2 would increase the total storage capacity of Shasta Lake by  
10 443,000 acre-feet. Therefore, CP2 would provide approximately 187,000 acre-  
11 feet more storage capacity in the reservoir than CP1. This additional capacity  
12 provided with the 12.5-foot dam raise would increase the flood control  
13 capabilities compared to both existing conditions and CP1, by further reducing  
14 the risk of flooding downstream from Shasta Dam. Therefore, the overall risk of  
15 flooding and its associated adverse effects on property, housing, and businesses  
16 downstream from Shasta Dam and residents throughout the primary study area  
17 would be further reduced.

18 The increased storage capacity proposed as a part of CP2 also would reduce the  
19 risk of job loss from flooding and its related effects to a greater extent than the  
20 capacity increase proposed under CP1. The increased storage capacity would  
21 further reduce the risk of flood-level conditions downstream from the dam.  
22 Related effects from flooding on the economic livelihood of residents of the  
23 primary study area would be similarly reduced.

24 Fewer flooding events would occur and less damage would be inflicted on  
25 property adjacent to downstream waterways during some flood events. This  
26 reduction in flood damage also would reduce residents' salary and wage losses  
27 resulting from these catastrophic events.

28 For the reasons described above, this impact would be beneficial. Mitigation for  
29 this impact is not needed, and thus not proposed.

30 *Impact Socio-8 (CP2): Long-Term Increases in Direct Employment in the*  
31 *Primary Study Area Related to Project Operations* In the long term,  
32 implementation of CP2 is expected to create at least two new maintenance-  
33 related positions at the Shasta Dam facilities. These two positions would be  
34 permanent and would continue after the 5-year construction period is  
35 completed. This impact would be minor but beneficial.

36 This impact would be the same as Impact Socio-8 (CP1) and would be minor  
37 but beneficial. Mitigation for this impact is not needed, and thus not proposed.

1                   **Lower Sacramento River and Delta**

2                   *Impact Socio-9 (CP2): Potential Temporary Increase in Indirect Employment in*  
3                   *Construction-Related Businesses of the Lower Sacramento River and Delta*

4                   Construction activities associated with CP2 would have the potential to result in  
5                   a short-term increase in indirect employment within the lower Sacramento River  
6                   and Delta portion of the extended study area. Depending on the location of  
7                   construction material sourced outside of the primary study area, indirect  
8                   increases in employment within construction-related businesses may result in  
9                   the lower Sacramento River and Delta area. This impact would be beneficial.

10                  This impact would be similar to but would be more beneficial than Impact  
11                  Socio-9 (CP1). A larger potential temporary increase in indirect employment in  
12                  construction-related businesses of the lower Sacramento River and Delta area  
13                  would be expected under CP2 than under CP1. Estimated total construction  
14                  costs for CP2 are approximately 9.5 percent higher than costs for CP1.  
15                  Therefore, more income would be allocated to indirect positions in  
16                  construction-related businesses under CP2. This impact would be beneficial.  
17                  Mitigation for this impact is not needed, and thus not proposed.

18                  *Impact Socio-10 (CP2): Short-Term Increases in Sales and Profits for*  
19                  *Businesses in the Lower Sacramento River and Delta Area that Support the*  
20                  *Construction Industry* A small amount of the construction materials used for  
21                  CP2 would be purchased within the extended study area. These purchases are  
22                  predicted to increase sales and profits of businesses within the lower  
23                  Sacramento River and Delta area over the 5-year construction period of CP1.  
24                  This impact would be beneficial.

25                  This impact would be similar to but would be more beneficial than Impact  
26                  Socio-10 (CP1). Because of the longer project duration and larger dam raise  
27                  proposed under CP2, short-term increases in sales and profits for construction-  
28                  related businesses in the lower Sacramento River and Delta area would be larger  
29                  than those under CP1. The exact scale of the increase in business sales and  
30                  profits within the lower Sacramento River and Delta area would be speculative,  
31                  but because additional time and materials would be required, implementing CP2  
32                  would likely generate more sales and profits for construction-related and  
33                  service-oriented businesses. This impact would be beneficial. Mitigation for this  
34                  impact is not needed, and thus not proposed.

35                  *Impact Socio-11 (CP2): Short-Term Increase in State Sales and Income Tax*  
36                  *Revenues in the Lower Sacramento River and Delta Area from Construction-*  
37                  *Related Personal Income and Purchases* In addition to local tax revenues, CP2  
38                  would increase short-term construction-related State sales and income tax  
39                  revenues received from businesses and residents of the lower Sacramento River  
40                  and Delta portion of the extended study area. These additional revenues would  
41                  be cycled back to local government coffers through statewide programs and  
42                  policies. This impact would be minor but beneficial.

1 This impact would be similar to but would be more beneficial than Impact  
2 Socio-11 (CP1) because the construction period would be longer and more  
3 construction materials would be needed. The increased employment and  
4 personal incomes anticipated as a part of implementation of CP2 would cause  
5 an increase in short-term construction-related State sales and income tax  
6 revenues received from businesses and residents of the lower Sacramento River  
7 and Delta portion of the extended study area. These additional revenues would  
8 be likely to be cycled back to local government coffers through statewide  
9 programs and policies. This impact would be minor but beneficial. Mitigation  
10 for this impact is not needed, and thus not proposed.

11 *Impact Socio-12 (CP2): Long-Term Reduction in the Adverse Economic Effects*  
12 *of Flooding in the Lower Sacramento River and Delta Area* As a result of the  
13 added reservoir capacity under CP2, the overall risk of flooding and its related  
14 consequences below Shasta Dam would be reduced. Although heavy rain events  
15 would continue to occur in the region, CP2 would provide greater flexibility in  
16 flood control in the lower Sacramento River and Delta area because of the  
17 increased capacity of the reservoir. As a result, less damage to existing  
18 structures and a smaller loss of potential future development would occur; this,  
19 in turn, would reduce salary and wage losses for residents in or near the lower  
20 Sacramento River floodplain and the Delta resulting from these catastrophic  
21 events, as well as would reduce business and personal income losses from such  
22 damage. Therefore, this impact would be beneficial.

23 This impact would be similar to but would be more beneficial than Impact  
24 Socio-12 (CP1). CP2 would provide approximately 187,000 acre-feet more  
25 storage capacity in the reservoir than CP1. This additional capacity would  
26 increase the flood control capabilities beyond the existing capabilities at Shasta  
27 Dam and the capabilities proposed under CP1, and would further reduce the risk  
28 of flooding downstream from the dam. The overall risk of flooding and its  
29 associated adverse effects on property, housing, businesses, and residents of the  
30 lower Sacramento River and Delta area would be reduced with implementation  
31 of CP2. Flood risk reduction effects identified earlier for CP1 would apply to  
32 CP2, but the positive effects would be greater because of the direct relationship  
33 between the proposed dam heights, corresponding capacity of the reservoir, and  
34 associated increase in flood control operations and management flexibility.

35 Increased storage capacity proposed as a part of CP2 also would reduce the risk  
36 of job loss from flooding and its related effects in the lower Sacramento River  
37 and Delta area, when compared to CP1. A reduction in the risk of flood-level  
38 conditions downstream from the dam would strengthen the economic livelihood  
39 of downstream residents in the lower Sacramento River and Delta area.

40 Fewer flooding events would occur and less damage would be inflicted on  
41 businesses located adjacent to downstream waterways during some flood  
42 events. This reduction in flood damage would reduce residents' salary and wage  
43 losses resulting from these catastrophic events.

1 For the reasons described above, this impact would be beneficial. Mitigation for  
2 this impact is not needed, and thus not proposed.

3 **CVP/SWP Service Areas**

4 *Impact Socio-13 (CP2): Short-Term Increases in Sales and Profits for*  
5 *Businesses in the CVP and SWP Service Areas that Support the Construction*  
6 *Industry* A small amount of the construction materials used during  
7 construction under CP2 would be purchased within the extended study area,  
8 including the CVP and SWP service areas. These purchases would result in a  
9 minor increase in sales and profits for a few businesses within the CVP and  
10 SWP service areas over the 5-year construction period of CP2. This impact  
11 would be minor but beneficial.

12 This impact would be similar to but would be more beneficial than Impact  
13 Socio-13 (CP1). Because of the longer project duration and larger dam raise  
14 proposed under CP2, short-term increases in sales and profits for some  
15 construction-related businesses in the extended study area, including the CVP  
16 and SWP service areas, would be larger than those for CP1. These increases  
17 have not been quantified, but the additional time and materials required to  
18 implement CP2 would be expected to generate more sales and profits for some  
19 construction-related and service-oriented businesses. This impact would be  
20 minor but beneficial. Mitigation for this impact is not needed, and thus not  
21 proposed.

22 *Impact Socio-14 (CP2): Potential Temporary Reduction in Shasta Project*  
23 *Water or Hydropower Supplied to the CVP and SWP Service Areas during*  
24 *Construction* Implementation of CP2 may require temporarily reducing the  
25 reservoir level at critical times during the construction period. This reduction in  
26 the reservoir level could temporarily reduce the amount of water or hydropower  
27 available from the dam and related hydropower infrastructure. Should this  
28 occur, sources of replacement water or hydropower would need to be secured. If  
29 these replacement resources were substantially more expensive, a minor  
30 negative effect on water or power customers may result. This impact would be  
31 potentially significant.

32 This impact would be similar to Impact Socio-14 (CP1), except that the project  
33 construction period would be longer and reductions in reservoir levels could last  
34 longer under CP2. This impact would be potentially significant. Mitigation for  
35 this impact is proposed in Section 16.3.5.

36 *Impact Socio-15 (CP2): Short-Term Increase in State Sales and Income Tax*  
37 *Revenues in the CVP and SWP Service Areas from Construction-Related*  
38 *Personal Income and Purchases* In addition to local tax revenue, CP2 would  
39 increase short-term construction-related State sales and income tax revenues  
40 received from businesses and residents of the CVP and SWP service areas.  
41 These additional revenues are expected to be cycled back to local government

1 coffers through statewide programs and policies. This impact would be  
2 beneficial.

3 This impact would be similar to but would be more beneficial than Impact  
4 Socio-15 (CP1). Short-term increases in State sales and income taxes would be  
5 larger under CP2 than under CP1. All of these increases are expected to be more  
6 beneficial for the relevant local jurisdictions. This impact would be minor but  
7 beneficial. Mitigation for this impact is not needed, and thus not proposed.

8 *Impact Socio-16 (CP2): Long-Term Increase in Agricultural Income and Jobs*  
9 *in the CVP and SWP Service Areas as a Result of Improved Water Availability*  
10 *and Reliability* Based on SWAP modeling, improved water availability and  
11 reliability expected to result from implementation of CP2 would substantially  
12 increase agricultural net income in the CVP and SWP service areas and increase  
13 the number of agricultural positions in these areas. This increase in production  
14 and jobs would contribute substantially to the continuation of this already strong  
15 industry in California. This impact would be beneficial.

16 This impact would be similar to but would be more beneficial than Impact  
17 Socio-16 (CP1). Water supply reliability in the CVP/SWP service areas would  
18 be greater under CP2 than under CP1. Because of the increase in the availability  
19 and reliability of water associated with implementation of CP2, the long-term  
20 increase in indirect employment within the agricultural sector would be larger  
21 than under CP1. Based on the outputs of SWAP modeling, CP2 is expected to  
22 generate an additional \$1.3 million in net income during average years and up to  
23 \$2.7 million during dry years, when compared to existing conditions. In wet  
24 years, net income under CP2 is projected to increase to \$2.9 million. This  
25 overall increase in net income is expected to stimulate more employment  
26 opportunities in the agricultural sector to support the higher crop production that  
27 likely would be the result of additional irrigation deliveries under CP2  
28 (compared to CP1). This impact would be beneficial. Mitigation for this impact  
29 is not needed, and thus not proposed.

30 *Impact Socio-17 (CP2): Reduction in Risk of Potential Water and Power*  
31 *Shortages (and Related Economic Activity) in the CVP and SWP Service Areas*  
32 *as a Result of Long-Term Improvements to Water and Power Supply Reliability*  
33 Implementation of CP2 would substantially increase Shasta Dam's storage  
34 capacity. As stated in Impact Socio-16 (CP2), this additional storage capacity  
35 would improve the long-term availability and reliability of water in the CVP  
36 and SWP service areas. Beyond increasing agricultural production, this  
37 improved availability and reliability would reduce the long-term risk of urban  
38 water and power shortages, and their related adverse economic consequences.  
39 This impact would be beneficial.

40 This impact would be the similar to but would be more beneficial than Impact  
41 Socio-17 (CP1). Mitigation for this impact is not needed, and thus not proposed.

1                   **CP3 – 18.5-Foot Dam Raise, Agricultural Water Supply Reliability and**  
2                   **Anadromous Fish Survival**

3                   CP3 focuses on increasing agricultural water supply reliability while also  
4                   increasing anadromous fish survival. This plan primarily consists of raising  
5                   Shasta Dam by 18.5 feet, which, in combination with spillway modifications,  
6                   would increase the height of the reservoir’s full pool by 20.5 feet and enlarge  
7                   the total storage capacity in the reservoir by 634,000 acre-feet to 5.19 MAF.  
8                   CP3 would increase the maximum surface area of the pool to 32,300 acres.  
9                   Because CP3 focuses on increasing agricultural water supply reliability, none of  
10                  the increased storage capacity in Shasta Reservoir would be reserved for  
11                  increasing M&I deliveries. Operations for water supply, hydropower, and  
12                  environmental and other regulatory requirements would be similar to existing  
13                  operations, with the additional storage retained for water supply reliability and  
14                  to expand the cold-water pool for downstream anadromous fisheries.

15                  Implementing CP3 would result in the replacement or modification of 8 bridges  
16                  and relocation of approximately 130 existing structures. The total construction  
17                  cost associated with CP3 would be approximately \$1,147 million.

18                  CP3 would help reduce estimated future agricultural water shortages and would  
19                  increase water supply reliability in the CVP service area by increasing firm  
20                  yield for agricultural deliveries, by at least 63,100 acre-feet per year in dry and  
21                  critical years and increasing average annual yield by about 61,700 acre-feet per  
22                  year. Almost half of the increased firm yield (i.e., 28,000 acre-feet) would be  
23                  for south-of-Delta agricultural deliveries, with the remainder for north-of-Delta  
24                  agricultural deliveries. In addition, CP3 would provide hydropower benefits by  
25                  increasing hydropower generation, by approximately 90 GWh per year.

26                  **Shasta Lake and Vicinity and Upper Sacramento River (Shasta Dam to**  
27                  **Red Bluff)**

28                  *Impact Socio-1 (CP3): Short-Term Increase in Population and Housing*  
29                  *Demand in the Primary Study Area Resulting from Construction-Related*  
30                  *Activities* According to Reclamation estimates, approximately 350 direct jobs  
31                  would be created as a result of construction activities associated with CP3. All  
32                  350 construction workers are expected to come from the local labor force;  
33                  therefore, a short-term population increase is not expected. This impact would  
34                  be less than significant.

35                  This impact would be similar to Impacts Socio-1 (CP1) and Socio-1 (CP2). CP3  
36                  would add 191,000 acre-feet of storage capacity beyond the capacity anticipated  
37                  in CP2, for a total increase of 634,000 acre-feet. Approximately 350  
38                  construction workers would be needed to complete the 18.5-foot raise proposed  
39                  for CP3, compared to 300 new construction workers required for CP1 and CP2.  
40                  Approximately 5 years of work (compared to the 4.5 years proposed under CP1)  
41                  would be required to complete the construction activities proposed under CP3.  
42                  Workers for this effort also would come from the local labor pool. This impact



1 would be less than significant. Mitigation for this impact is not needed, and thus  
2 not proposed.

3 *Impact Socio-2 (CP3): Short-Term Increases in Direct, Indirect, and Induced*  
4 *Employment in the Primary Study Area Related to Construction Activities*

5 Construction activities associated with CP3 are expected to generate  
6 approximately 350 direct construction jobs, 450 indirect jobs in various  
7 construction-related support industries, and 700 induced jobs because of  
8 increased household spending in the primary study area. Individuals to fill these  
9 jobs are expected to be drawn from the local community. These jobs are  
10 expected to provide important but temporary employment opportunities to many  
11 unemployed construction workers in the primary study area. This impact would  
12 be beneficial.

13 This impact would be similar to Impact Socio-2 (CP1) and Socio-2 (CP2).  
14 Under CP3, approximately 350 short-term, direct construction jobs would be  
15 created, in addition to 450 indirect jobs expected to be created in various  
16 construction-related support industries, and 700 induced jobs created because of  
17 increased household spending near the project area. Total direct, indirect, and  
18 induced employment under CP3 would be greater than CP1 and CP2, and these  
19 positions would last approximately 5 years under CP3, compared to 4.5 years  
20 under CP1. This impact would be beneficial. Mitigation for this impact is not  
21 needed, and thus not proposed.

22 *Impact Socio-3 (CP3): Potential for Temporary Reduction in the Labor Force*  
23 *of Related Industrial Sectors in the Primary Study Area as a Result of Direct*  
24 *Construction-Related Employment* With the creation of 350 construction jobs  
25 resulting from CP3, the potential would exist for workers from other industries  
26 to move to jobs related to construction at Shasta Dam. Because of the size of the  
27 construction industry in the primary study area and the high unemployment rate  
28 in the area, this impact would be less than significant.

29 This impact would be similar to Impacts Socio-3 (CP1) and Socio-3 (CP2). CP3  
30 would require 50 more construction workers than required for CP1 and CP2.  
31 This impact would be less than significant. Mitigation for this impact is not  
32 needed, and thus not proposed.

33 *Impact Socio-4 (CP3): Short-Term Increases in Direct, Indirect, and Induced*  
34 *Personal Income Paid to Employees in the Primary Study Area Hired for*

35 *Construction-Related Activities* Based on calculations completed as a part of  
36 Reclamation's IMPLAN socioeconomic model process, more than \$93.6  
37 million in personal income would be directly paid to employees in the primary  
38 study area each year of the 5-year construction period under CP3. In addition,  
39 more than \$52.5 million in indirect and induced income is expected to be  
40 generated in various construction-related and other industries in the primary  
41 study area each year of construction under CP3. The combined \$146.2 million  
42 in personal income to be generated would represent a 93.2 percent increase in

1 all annual personal income in the local economic study area. This impact would  
2 be beneficial.

3 This impact would be similar to but would be more beneficial than Impacts  
4 Socio-4 (CP1) and Socio-4 (CP2). CP3 would generate \$93.6 million in direct  
5 personal income each year of construction, from the 350 direct construction-  
6 related jobs that would be created. In addition, indirect and induced personal  
7 income totaling \$52.5 million per year of construction would be generated in  
8 various construction-related and other industries in the primary study area that  
9 would support construction under CP3. The combined direct, indirect, and  
10 induced personal income resulting from CP3 would be approximately \$146.2  
11 million per year of construction within the local economic study area. This  
12 increase in personal income would represent an approximately 93.2 percent  
13 increase in all annual personal income in the local economic study area.

14 Direct, indirect, and induced annual personal income under CP3 would be  
15 greater than CP1 and CP2. Overall, a total income of \$730.9 million would be  
16 generated under CP3 over the 5-year construction period, compared to a total of  
17 \$568.0 million for CP1 and to a total of \$627.0 million for CP2. This impact  
18 would be beneficial. Mitigation for this impact is not needed, and thus not  
19 proposed.

20 *Impact Socio-5 (CP3): Short-Term Increases in Sales and Profits for Businesses*  
21 *in the Primary Study Area that Support the Construction Industry* Most of the  
22 construction materials used for CP3 are expected to be purchased within the  
23 primary study area. These purchases would provide the local economy with  
24 increased sales and profits over the 5-year construction period. This impact  
25 would be beneficial.

26 This impact would be similar to but would be more beneficial than Impacts  
27 Socio-5 (CP1) and Socio-5 (CP2). CP3 would require the largest dam height  
28 increase and, therefore, the greatest construction expenditures over the total  
29 construction period. As a result, CP3 would generate more business sales and  
30 profits than CP1 and CP2 in construction-related and service-oriented  
31 businesses in the primary study area. During the construction period,  
32 implementation of CP3 is expected to generate more than \$370.2 million per  
33 year in sales and profits for businesses that support the construction industry,  
34 with approximately \$229.4 million in direct income and \$140.9 in direct and  
35 induced income. CP3 would generate an overall total of \$412.4 million and  
36 \$263.0 million more in sales and profits than CP1 and CP2, respectively, for  
37 construction-related and service-oriented businesses. This impact would be  
38 beneficial. Mitigation for this impact is not needed, and thus not proposed.

39 *Impact Socio-6 (CP3): Short-Term Increase in State and Local Sales Tax*  
40 *Revenues in the Primary Study Area from Construction-Related Personal*  
41 *Income and Purchases* As stated above, implementation of CP3 is expected to  
42 result in a substantial increase in total personal income (direct, indirect, and

1 induced) over the 5-year construction period. This additional income, in  
2 combination with the construction-related purchases in the primary study area,  
3 would result in a substantial increase in local sales tax revenues from increased  
4 consumer spending in nearby cities and counties. Construction-related activities  
5 under CP3 would be likely also to result in a temporary increase in State sales  
6 and income tax revenues received from businesses and residents of the primary  
7 study area. The exact amount of State and local sales tax revenue increases  
8 would be speculative: however, this impact would be beneficial.

9 This impact would be similar to but would be more beneficial than Impacts  
10 Socio-6 (CP1) and Socio-6 (CP2). CP3 would generate more direct, indirect,  
11 and induced personal income and more sales and profits for businesses over the  
12 construction period than CP1 and CP2 (see Impacts Socio-4 (CP3) and Socio-5  
13 (CP3), above). This larger amount of personal income generated is expected to  
14 result in more local sales tax revenues in the primary study area than under the  
15 other two alternatives. Construction-related activities under CP3 also are  
16 expected to result in a temporary increase in State sales and income tax  
17 revenues received from businesses and residents of the primary study area.  
18 These additional revenues would be likely to be cycled back to local  
19 government coffers through statewide programs and policies. This impact  
20 would be beneficial. Mitigation for this impact is not needed, and thus not  
21 proposed.

22 *Impact Socio-7 (CP3): Long-Term Reduction in the Adverse Economic Effects*  
23 *of Flooding in the Primary Study Area* As a result of the added reservoir  
24 capacity created by CP3, the overall risk of flooding and its related  
25 consequences below Shasta Dam are expected to be reduced. Although heavy  
26 rain events would continue to occur in the region and locally, and potentially  
27 increase with global climate change, the project is intended to provide greater  
28 flexibility in flood control downstream because of the increased capacity of the  
29 reservoir. As a result, less damage to existing structures and a smaller loss of  
30 potential future development would occur; this, in turn, would reduce salary and  
31 wage losses for residents of the primary study area, as well as business and  
32 personal income losses from such damage. Therefore, this impact would be  
33 beneficial.

34 This impact would be similar to but would be more beneficial than Impacts  
35 Socio-7 (CP1) and Socio-7 (CP2). CP3 would create 634,000 acre-feet more  
36 storage capacity than current capacity, more than 40 percent more than would  
37 be provided by CP2. CP3 would, therefore, provide substantially more flood  
38 protection than either CP1 or CP2. As a result, CP3 would result in a greater  
39 reduction than CP1 and CP2 in the risk of damage to property and structures  
40 from flooding along the upper Sacramento River.

41 The increased storage capacity proposed as a part of CP3 would result in a  
42 larger decrease in the risk of job loss from flooding and its related effects than  
43 would occur under CP1 or CP2. CP3 would increase storage space in Shasta

1 Lake and would provide approximately 191,000 more acre-feet of storage than  
2 either of the two previous alternatives. The increased storage capacity would  
3 create a greater reduction in the risk of flood-level conditions downstream from  
4 the dam. Related effects from flooding on the economic livelihood of residents  
5 of the primary study area would similarly be reduced. In addition, the reduction  
6 in flood damage would reduce residents' salary and wage losses resulting from  
7 these catastrophic events.

8 For the reasons described above, this impact would be beneficial. Mitigation for  
9 this impact is not needed, and thus not proposed.

10 *Impact Socio-8 (CP3): Long-Term Increases in Direct Employment in the*  
11 *Primary Study Area Related to Project Operations* In the long term,  
12 implementation of CP3 would create at least two new maintenance-related  
13 positions at the Shasta Dam facilities. These two positions are expected to be  
14 permanent and would continue once the 5-year construction period is  
15 completed. This impact would be minor but beneficial.

16 This impact would be the same as Impacts Socio-8 (CP1) and Socio-8 (CP2)  
17 and would be minor but beneficial. Mitigation for this impact is not needed, and  
18 thus not proposed.

#### 19 **Lower Sacramento River and Delta**

20 *Impact Socio-9 (CP3): Potential Temporary Increase in Indirect Employment in*  
21 *Construction-Related Businesses of the Lower Sacramento River and Delta*  
22 Construction activities associated with CP3 would have the potential to result in  
23 a short-term increase in indirect employment within the lower Sacramento River  
24 and Delta portion of the extended study area. Depending on the location of  
25 construction materials sourced outside of the primary study area, indirect  
26 increases in employment within some construction-related businesses may  
27 result in the lower Sacramento River and Delta area. This impact would be  
28 minor but beneficial.

29 This impact would be similar to but would be more beneficial than Impacts  
30 Socio-9 (CP1) and Socio-9 (CP2). A larger potential temporary increase in  
31 indirect employment in construction-related businesses of the lower Sacramento  
32 River and Delta area would be expected under CP3. Estimated total construction  
33 costs for CP3 are approximately 22.3 percent higher than costs for CP1 and 14.2  
34 percent higher than costs for CP2. Therefore, more income would be allocated  
35 to indirect positions in construction-related businesses than would be expected  
36 under CP1 and CP2. This impact would be minor but beneficial. Mitigation for  
37 this impact is not needed, and thus not proposed.

38 *Impact Socio-10 (CP3): Short-Term Increases in Sales and Profits for*  
39 *Businesses in the Lower Sacramento River and Delta Area that Support the*  
40 *Construction Industry* A small amount of the construction materials used for  
41 CP3 would be purchased within the extended study area. These purchases are

1 predicted to increase sales and profits of businesses within the lower  
2 Sacramento River and Delta area over the 5-year construction period of CP3.  
3 This impact would be beneficial.

4 This impact would be similar to but would be more beneficial than Impacts  
5 Socio-10 (CP1) and Socio-1 (CP2). Because of the longer project duration and  
6 greater construction expenditures associated with the larger dam raise proposed  
7 under CP3, short-term increases in sales and profits for construction-related  
8 businesses in the lower Sacramento River and Delta area would be larger than  
9 those for CP 1 and CP2. These increases have not yet been quantified, but  
10 because additional time and materials would be required, implementing CP3  
11 would generate more sales and profits for construction-related and service-  
12 oriented businesses. This impact would be minor but beneficial. Mitigation for  
13 this impact is not needed, and thus not proposed.

14 *Impact Socio-11 (CP3): Short-Term Increase in State Sales and Income Tax*  
15 *Revenues in the Lower Sacramento River and Delta Area from Construction-*  
16 *Relate Personal Income and Purchases* In addition to local tax revenues, CP3  
17 is expected to increase short-term, construction-related, State sales and income  
18 tax revenues received from businesses and residents of the lower Sacramento  
19 River and Delta portion of the extended study area. These additional revenues  
20 are expected to be cycled back to local government coffers through statewide  
21 programs and policies. This impact would be minor but beneficial.

22 This impact would be similar to but would be more beneficial than Impact  
23 Socio-11 (CP1), and Socio-11 (CP2) because the construction period would be  
24 longer and more construction materials would be needed. The increased  
25 employment and personal incomes anticipated as a part of implementation of  
26 CP3 would cause an increase in short-term, construction-related, State sales and  
27 income tax revenues received from some businesses and residents of the lower  
28 Sacramento River and Delta portion of the extended study area. These  
29 additional revenues likely would be cycled back to local government coffers  
30 through statewide programs and policies. This impact would be minor but  
31 beneficial. Mitigation for this impact is not needed, and thus not proposed.

32 *Impact Socio-12 (CP3): Long-Term Reduction in the Adverse Economic Effects*  
33 *of Flooding in the Lower Sacramento River and Delta Area* As a result of the  
34 added reservoir capacity under CP3, the overall risk of flooding and its related  
35 consequences below Shasta Dam would be reduced. Although heavy rain events  
36 would continue to occur in the region, as well as potentially increase with global  
37 climate change, CP3 is intended to provide greater flexibility in flood control in  
38 the lower Sacramento River and Delta area because of the increased capacity of  
39 the reservoir. As a result, less damage to existing structures and a smaller loss of  
40 potential future development would occur; this, in turn, would reduce salary and  
41 wage losses for residents in and near the lower Sacramento River floodplain and  
42 the Delta resulting from these catastrophic events, as well as would reduce

1 business and personal income losses from such damage. Therefore, this impact  
2 would be beneficial.

3 This impact would be similar to but would be more beneficial than Impacts  
4 Socio-12 (CP1) and Socio-12 (CP2). CP3 would provide approximately  
5 191,000 acre-feet more storage capacity in the reservoir than either of the two  
6 previous alternatives. This additional capacity would increase the flood control  
7 capabilities beyond the existing capabilities at Shasta Dam and the capabilities  
8 proposed under CP1 and CP2, and would further reduce the risk of flooding  
9 downstream from the dam. The overall risk of flooding and its associated  
10 adverse effects on property, housing, businesses, and residents of the lower  
11 Sacramento River and Delta area would be reduced with implementation of  
12 CP3. Flood risk reduction effects identified for CP1 and CP2 would apply to  
13 CP3, but the positive effects would be greater because of the direct relationship  
14 between the proposed dam heights, corresponding capacity of the reservoir, and  
15 associated increase in flood control operations and management flexibility.

16 Increased storage capacity proposed as a part of CP3 also would reduce the risk  
17 of job loss from flooding and its related effects in the lower Sacramento River  
18 and Delta area. A reduction in the risk of flood-level conditions downstream  
19 from the dam would strengthen the economic livelihood of downstream  
20 residents in the lower Sacramento River and Delta portion of the extended study  
21 area. This impact would be beneficial. Mitigation for this impact is not needed,  
22 and thus not proposed.

### 23 **CVP/SWP Service Areas**

24 *Impact Socio-13 (CP3): Short-Term Increases in Sales and Profits for*  
25 *Businesses in the CVP and SWP Service Areas that Support the Construction*  
26 *Industry* A small amount of the construction materials used during  
27 construction under CP3 would be purchased within the extended study area.  
28 These purchases are predicted to increase sales and profits of some businesses  
29 within the CVP and SWP service areas over the 5-year construction period of  
30 CP3. This impact would be minor but beneficial.

31 This impact would be similar to but would be more beneficial than Impact  
32 Socio-13 (CP1) because the construction period would be longer and more  
33 construction materials would be needed. This impact would be minor but  
34 beneficial. Mitigation for this impact is not needed, and thus not proposed.

35 *Impact Socio-14 (CP3): Potential Temporary Reduction in Shasta Project*  
36 *Water or Hydropower Supplied to the CVP and SWP Service Areas during*  
37 *Construction* Implementation of CP3 may require temporarily reducing the  
38 reservoir level at critical times during the construction period. This reduction in  
39 the reservoir level could temporarily reduce the amount of water or hydropower  
40 available from the dam and related hydropower infrastructure. Should this  
41 occur, sources of replacement water or hydropower would need to be secured. If  
42 these replacement resources were substantially more expensive, a minor

1 negative effect on water or power customers may result. This impact would be  
2 potentially significant.

3 This impact would be similar to Impact Socio-14 (CP1), except that the project  
4 construction period would be longer. This impact would be potentially  
5 significant. Mitigation for this impact is proposed in Section 16.3.5.

6 *Impact Socio-15 (CP3): Short-Term Increase in State Sales and Income Tax*  
7 *Revenues in the CVP and SWP Service Areas from Construction-Related*  
8 *Personal Income and Purchases* In addition to local tax revenue, CP3 is  
9 expected to increase short-term, construction-related, State sales and income tax  
10 revenues received from businesses and residents of the CVP and SWP service  
11 areas. These additional revenues are expected to be cycled back to local  
12 government coffers through statewide programs and policies. This impact  
13 would be beneficial.

14 This impact would be similar to but would be more beneficial than Impacts  
15 Socio-15 (CP1) and Socio-15 (CP2). Short-term increases in State sales and  
16 income taxes are expected to be larger under CP3 than under CP1 and CP2. All  
17 of these increases are expected to be more beneficial for the relevant local  
18 jurisdictions. This impact would be beneficial. Mitigation for this impact is not  
19 needed, and thus not proposed.

20 *Impact Socio-16 (CP3): Long-Term Increase in Agricultural Income and Jobs*  
21 *in the CVP and SWP Service Areas as a Result of Improved Water Availability*  
22 *and Reliability* Based on SWAP modeling, improved water availability and  
23 reliability expected to result from implementation of CP3 would substantially  
24 increase agricultural net income in the CVP and SWP service areas and increase  
25 the number of agricultural positions in these areas. This increase in production  
26 and jobs would contribute substantially to the continuation of this already strong  
27 industry in California. This impact would be beneficial.

28 This impact would be similar to but would be more beneficial than Impacts  
29 Socio-16 (CP1) and Socio-16 (CP2). CP3 would increase water supply  
30 reliability by increasing firm water supplies for CVP irrigation deliveries.  
31 Because of the increase in the availability and reliability of water associated  
32 with implementation of CP3, the long-term increase in indirect employment  
33 within the agricultural sector is expected to be larger than under CP1 and CP2.  
34 Based on the outputs of SWAP modeling, CP3 would generate an additional  
35 \$5.1 million in net income during average years and \$8.5 million during dry  
36 years, when compared to existing conditions. In wet years, net income under  
37 CP3 is projected to decrease to \$4.4 million. Overall, CP3 is projected to result  
38 in a greater increase in net income during average, dry, and wet years, when  
39 compared to net income projected for CP1 and CP2. The projected increase in  
40 net income under CP3 is expected to stimulate a greater number of employment  
41 opportunities in the agricultural sector than under CP1 and CP2, because higher

1 crop production would be likely. This impact would be beneficial. Mitigation  
2 for this impact is not needed, and thus not proposed.

3 *Impact Socio-17 (CP3): Reduction in Risk of Potential Water and Power*  
4 *Shortages (and Related Economic Activity) in the CVP and SWP Service Areas*  
5 *as a Result of Long-Term Improvements to Water and Power Supply Reliability*  
6 Implementation of CP3 would substantially increase Shasta Dam's storage  
7 capacity. As stated in Impact Socio-16 (CP3), this additional storage capacity  
8 would improve long-term water availability and reliability in the CVP and SWP  
9 service areas. Beyond increasing agricultural production, this improved  
10 availability and reliability would reduce the long-term risk of urban water and  
11 power shortages, and their related adverse economic consequences. This impact  
12 would be beneficial.

13 This impact would be the similar to CP1 and CP2 and would be beneficial.  
14 Mitigation for this impact is not needed, and thus not proposed.

15 **CP4 – 18.5-Foot Dam Raise, Anadromous Fish Focus with Water Supply**  
16 **Reliability**

17 CP4 focuses on increasing anadromous fish survival while also increasing water  
18 supply reliability. By raising Shasta Dam 18.5 feet, in combination with  
19 spillway modifications, CP4 would increase the height of the reservoir full pool  
20 by 20.5 feet and enlarge the total storage capacity in the reservoir by 634,000  
21 acre-feet to 5.19 MAF. CP4 would increase the maximum surface area of the  
22 pool to 32,300 acres. The additional storage created by the 18.5-foot dam raise  
23 would be used to improve the ability to meet temperature objectives and habitat  
24 requirements for anadromous fish during drought years and increase water  
25 supply reliability. Of the increased reservoir storage space, about 378,000 acre-  
26 feet would be dedicated to increasing the supply of cold water for anadromous  
27 fish survival purposes. Operations for the remaining portion of increased  
28 storage (approximately 256,000 acre-feet) would be the same as in CP1, with 70  
29 TAF and 35 TAF reserved specifically to focus on increasing M&I deliveries  
30 during dry and critical years, respectively. CP4 also would involve augmenting  
31 spawning gravel and restoring riparian, floodplain, and side-channel habitat at  
32 up to six potential locations in the upper Sacramento River.

33 Implementing CP4 would result in the replacement or modification of 8 bridges  
34 and relocation of approximately 130 existing structures. The total construction  
35 cost associated with CP4 would be approximately \$1,154 million.

36 CP4 would help reduce estimated future agricultural and M&I water shortages  
37 and would increase water supply reliability in the CVP/SWP service areas by  
38 increasing firm yield for agricultural and M&I deliveries, by at least 47,300  
39 acre-feet per year in dry and critical years and increasing average annual yield  
40 by about 31,000 acre-feet per year. The majority of the firm yield (i.e., 42,700  
41 acre-feet) would be for south-of-Delta agricultural and M&I deliveries. In



1 addition, CP4 would provide hydropower benefits by increasing hydropower  
2 generation by approximately 133 GWh per year.

3 **Shasta Lake and Vicinity and Upper Sacramento River (Shasta Dam to**  
4 **Red Bluff)**

5 *Impact Socio-1 (CP4): Short-Term Increase in Population and Housing*  
6 *Demand in the Primary Study Area Resulting from Construction-Related*  
7 *Activities* According to Reclamation estimates, approximately 350 direct jobs  
8 would be created as a result of construction activities associated with CP4. All  
9 350 construction workers are expected to come from the local labor force;  
10 therefore, a short-term population increase is not expected. This impact would  
11 be less than significant.

12 This impact would be the same as Impact Socio-1 (CP3) and would be less than  
13 significant. Mitigation for this impact is not needed, and thus not proposed.

14 *Impact Socio-2 (CP4): Short-Term Increases in Direct, Indirect, and Induced*  
15 *Employment in the Primary Study Area Related to Construction Activities*  
16 Construction activities associated with CP4 are expected to generate  
17 approximately 350 construction jobs, 450 indirect jobs in various construction-  
18 related support industries, and 700 induced jobs because of increased household  
19 spending in the primary study area. Individuals to fill these jobs are expected to  
20 be drawn from the local community. These new jobs would provide important  
21 but temporary employment opportunities to many unemployed construction  
22 workers in the primary study area. This impact would be beneficial.

23 This impact would be the same as Impact Socio-2 (CP3) and would be  
24 beneficial. Mitigation for this impact is not needed, and thus not proposed.

25 *Impact Socio-3 (CP4): Potential for Temporary Reduction in the Labor Force*  
26 *of Related Industrial Sectors in the Primary Study Area as a Result of Direct*  
27 *Construction-Related Employment* With the creation of 350 construction jobs  
28 resulting from CP4, the potential would exist for workers from other industries  
29 to move to jobs related to construction at Shasta Dam. Because of the size of the  
30 construction industry in the primary study area and the high unemployment rate  
31 in the area, this impact would be less than significant.

32 This impact would be the same as Impact Socio-3 (CP3) and would be less than  
33 significant. Mitigation for this impact is not needed, and thus not proposed.

34 *Impact Socio-4 (CP4): Short-Term Increases in Direct, Indirect, and Induced*  
35 *Personal Income Paid to Employees in the Primary Study Area Hired for*  
36 *Construction-Related Activities* Construction activities for CP4 would last 5-  
37 years, compared to 4.5 years for CP1. Additional construction activities would  
38 be required for augmenting spawning gravel and restoring riparian, floodplain,  
39 and side-channel habitat. Based on calculations completed as a part of  
40 Reclamation's IMPLAN socioeconomic model process, more than \$94.2

1 million in personal income would be directly paid to employees in the primary  
2 study area each year of construction. In addition, more than \$52.9 million in  
3 indirect and induced income would be generated in various construction-related  
4 and other industries in the primary study area each year of construction under  
5 CP4. The combined \$147.1 million in personal income generated would  
6 represent an approximately 93.2 percent increase in all annual personal income  
7 in the local economic study area. This impact would be beneficial.

8 This impact would be similar to Impact Socio-4 (CP3). CP3 is estimated to  
9 generate \$94.2 million in direct personal income each year of construction from  
10 the 350 direct construction-related jobs that would be created. In addition,  
11 indirect and induced personal income totaling \$52.9 million per year of  
12 construction would be generated in various construction-related and other  
13 industries in the primary study area that would support construction under CP3.  
14 In combination, direct, indirect, and induced personal income resulting from  
15 CP3 would be approximately \$147.1 million per year of construction within the  
16 local economic study area. This increase in personal income would represent an  
17 approximately 93.2 percent increase in all annual personal income in the local  
18 economic study area.

19 Additional construction activities associated with augmenting spawning gravel  
20 and restoring riparian, floodplain, and side-channel habitat would occur under  
21 CP4. During the 5-year construction period, more than \$735.7 million in  
22 personal income would be generated by direct, indirect, and induced  
23 employment produced by CP4, and this would be \$4.8 million more personal  
24 income than generated under CP3. This impact would be beneficial. Mitigation  
25 for this impact is not needed, and thus not proposed.

26 *Impact Socio-5 (CP4): Short-Term Increases in Sales and Profits for Businesses*  
27 *in the Primary Study Area that Support the Construction Industry* Most of the  
28 construction materials used for CP4 would be purchased within the primary  
29 study area. These purchases would provide the local economy with increased  
30 sales and profits over the 5-year construction period. This impact would be  
31 beneficial.

32 This impact would be similar to but more beneficial than Impact Socio-5 (CP3).  
33 During the construction period, implementation of CP4 would generate more  
34 than \$372.7 million per year in sales and profits for construction-related and  
35 service-oriented businesses that support the construction industry, with  
36 approximately \$230.9 million in direct income and \$141.8 in direct and induced  
37 income. CP4 would generate an overall total of \$2.5 million more per year in  
38 sales and profits than CP3 for construction-related and service-oriented  
39 businesses. This impact would be beneficial. Mitigation for this impact is not  
40 needed, and thus not proposed.

41 *Impact Socio-6 (CP4): Short-Term Increase in State and Local Sales Tax*  
42 *Revenues in the Primary Study Area from Construction-Related Personal*

1            *Income and Purchases* As stated above, implementation of CP4 is expected to  
2 result in a substantial increase in total personal income (direct, indirect, and  
3 induced) over the 5-year construction period. This additional income, in  
4 combination with the construction-related purchases in the primary study area,  
5 would result in a substantial increase in local sales tax revenues from increased  
6 consumer spending in nearby cities and counties. Construction-related activities  
7 under CP4 would likely result in a temporary increase in State sales and income  
8 tax revenues received from businesses and residents of the primary study area.  
9 The exact amount of State and local sales tax revenue increases would be  
10 speculative; however, this impact would be beneficial.

11            This impact would be similar but more beneficial than Impact Socio-6 (CP3).  
12 CP4 would generate more direct, indirect, and induced personal income and  
13 more sales and profits for businesses over the construction period than CP3 (see  
14 Impacts Socio-4 (CP4) and Socio-5 (CP4), above). This impact would be  
15 beneficial. Mitigation for this impact is not needed, and thus not proposed.

16            *Impact Socio-7 (CP4): Long-Term Reduction in the Adverse Economic Effects*  
17 *of Flooding in the Primary Study Area* As a result of the added reservoir  
18 capacity created by CP4, the overall risk of flooding and its related  
19 consequences below Shasta Dam would be reduced. Although heavy rain events  
20 would continue to occur in the region and locally, and potentially increase with  
21 global climate change, the project is intended to provide greater flexibility in  
22 flood control downstream because of the increased capacity of the reservoir. As  
23 a result, less damage to existing structures and a smaller loss of potential future  
24 development would occur; this, in turn, would reduce salary and wage losses for  
25 residents of the primary study area, as well as would reduce business and  
26 personal income losses from such damage. Therefore, this impact would be  
27 beneficial.

28            This impact would be the same as Impact Socio-7 (CP3) and would be  
29 beneficial. Mitigation for this impact is not needed, and thus not proposed.

30            *Impact Socio-8 (CP4): Long-Term Increases in Direct Employment in the*  
31 *Primary Study Area Related to Project Operations* In the long term,  
32 implementation of CP4 would create at least two new maintenance-related  
33 positions at the Shasta Dam facilities. These two positions would be permanent  
34 and would continue once the 5-year construction period is completed. This  
35 impact would be minor but beneficial.

36            This impact would be the same as Impact Socio-8 (CP3) and would be minor  
37 but beneficial. Mitigation for this impact is not needed, and thus not proposed.

38            **Lower Sacramento River and Delta**

39            *Impact Socio-9 (CP4): Potential Temporary Increase in Indirect Employment in*  
40 *Construction-Related Businesses of the Lower Sacramento River and Delta*  
41 Construction activities associated with CP4 have the potential to result in a

1 short-term increase in indirect employment within the lower Sacramento River  
2 and Delta portion of the extended study area. Depending on the location of  
3 construction material sourced outside of the primary study area, indirect  
4 increases in employment within construction-related businesses may result in  
5 the lower Sacramento River and Delta area. This impact would be minor but  
6 beneficial.

7 This impact would be similar to Impact Socio-9 (CP3) and would be minor but  
8 beneficial. Mitigation for this impact is not needed, and thus not proposed.

9 *Impact Socio-10 (CP4): Short-Term Increases in Sales and Profits for*  
10 *Businesses in the Lower Sacramento River and Delta Area that Support the*  
11 *Construction Industry* A small amount of the construction materials used for  
12 CP4 would be purchased within the extended study area. These purchases are  
13 predicted to increase sales and profits of some businesses within the lower  
14 Sacramento River and Delta area over the 5-year construction period of CP4.  
15 This impact would be minor but beneficial.

16 This impact would be similar to Impact Socio-10 (CP3) and would be minor but  
17 beneficial. Mitigation for this impact is not needed, and thus not proposed.

18 *Impact Socio-11 (CP4): Short-Term Increase in State Sales and Income Tax*  
19 *Revenues in the Lower Sacramento River and Delta Area from Construction-*  
20 *Related Personal Income and Purchases* In addition to local tax revenues, CP4  
21 is expected to increase short-term, construction-related, State sales and income  
22 tax revenues received from businesses and residents of the lower Sacramento  
23 River and Delta portion of the extended study area. These additional revenues  
24 are expected to be cycled back to local government coffers through statewide  
25 programs and policies. This impact would be minor but beneficial.

26 This impact would be similar to Impact Socio-11 (CP3) and would be minor but  
27 beneficial. Mitigation for this impact is not needed, and thus not proposed.

28 *Impact Socio-12 (CP4): Long-Term Reduction in the Adverse Economic Effects*  
29 *of Flooding in the Lower Sacramento River and Delta Area* As a result of the  
30 added reservoir capacity under CP4, the overall risk of flooding and its related  
31 consequences below Shasta Dam would be reduced. Although heavy rain events  
32 would continue to occur in the region, and potentially increase with global  
33 climate change, CP4 is intended to provide greater flexibility in flood control in  
34 the lower Sacramento River and Delta area because of the increased capacity of  
35 the reservoir. As a result, less damage to existing structures and a smaller loss of  
36 potential future development would occur; this, in turn, would reduce salary and  
37 wage losses for residents in and near the lower Sacramento River floodplain and  
38 the Delta resulting from these catastrophic events, as well as would reduce  
39 business and personal income losses from such damage. Therefore, this impact  
40 would be beneficial.

1 This impact would be the same as Impact Socio-12 (CP3) and would be  
2 beneficial. Mitigation for this impact is not needed, and thus not proposed.

3 **CVP/SWP Service Areas**

4 *Impact Socio-13 (CP4): Short-Term Increases in Sales and Profits for*  
5 *Businesses in the CVP and SWP Service Areas that Support the Construction*  
6 *Industry* A small amount of the construction materials used during  
7 construction under CP4 would be purchased within the extended study area.  
8 These purchases are predicted to increase sales and profits of some businesses  
9 within the CVP and SWP service areas over the 5-year construction period of  
10 CP4. This impact would be minor but beneficial.

11 This impact would be similar to Impact Socio-13 (CP3) and would be minor but  
12 beneficial. Mitigation for this impact is not needed, and thus not proposed.

13 *Impact Socio-14 (CP4): Potential Temporary Reduction in Shasta Project*  
14 *Water or Hydropower Supplied to the CVP and SWP Service Areas during*  
15 *Construction* Implementation of CP4 may require temporarily reducing the  
16 reservoir level at critical times during the construction period. This reduction in  
17 the reservoir level could temporarily reduce the amount of water or hydropower  
18 available from the dam and related hydropower infrastructure. Should this  
19 occur, sources of replacement water or hydropower would need to be secured. If  
20 these replacement resources were substantially more expensive, a minor  
21 negative effect on water or power customers may result. This impact would be  
22 potentially significant.

23 This impact would be the same as Impact Socio-14 (CP3) and would be  
24 potentially significant. Mitigation for this impact is proposed in Section 16.3.5.

25 *Impact Socio-15 (CP4): Short-Term Increase in State Sales and Income Tax*  
26 *Revenues in the CVP and SWP Service Areas from Construction-Related*  
27 *Personal Income and Purchases* In addition to local tax revenue, CP4 is  
28 expected to increase short-term, construction-related, State sales and income tax  
29 revenues received from some businesses and residents of the CVP and SWP  
30 service areas. These additional revenues are expected to be cycled back to local  
31 government coffers through statewide programs and policies. This impact  
32 would be minor but beneficial.

33 This impact would be very similar to Impact Socio-15 (CP3) and would be  
34 minor but beneficial. Mitigation for this impact is not needed, and thus not  
35 proposed.

36 *Impact Socio-16 (CP4): Long-Term Increase in Agricultural Income and Jobs*  
37 *within the CVP and SWP Service Areas as a Result of Improved Water*  
38 *Availability and Reliability* Based on SWAP modeling, improved water  
39 availability and reliability expected to result from implementation of CP4 would  
40 substantially increase agricultural net income in the CVP and SWP service

1 areas. This increase in production would contribute substantially to the  
2 continuation of this already strong industry in California. This impact would be  
3 beneficial.

4 This impact would be the same as Impact Socio-16 (CP1) and would be  
5 beneficial. Mitigation for this impact is not needed, and thus not proposed.

6 *Impact Socio-17 (CP4): Reduction in Risk of Potential Water and Power*  
7 *Shortages (and Related Economic Activity) in the CVP and SWP Service Areas*  
8 *as a Result of Long-Term Improvements to Water and Power Supply Reliability*

9 Implementation of CP4 would substantially increase Shasta Dam's storage  
10 capacity. As stated in Impact Socio-16 (CP4), this additional storage capacity  
11 would improve long-term water availability and reliability in the CVP and SWP  
12 service areas. Beyond increasing agricultural production, this improved  
13 availability and reliability would reduce the long-term risk of urban water and  
14 power shortages, and their related adverse economic consequences. This impact  
15 would be beneficial.

16 This impact would be the similar to CP1, CP2, and CP3 and would be  
17 beneficial. Mitigation for this impact is not needed, and thus not proposed.

18 **CP5 – 18.5-Foot Dam Raise, Combination Plan**

19 CP5 primarily focuses on increasing water supply reliability, anadromous fish  
20 survival, Shasta Lake area environmental resources, and recreation  
21 opportunities. By raising Shasta Dam 18.5 feet, in combination with spillway  
22 modifications, CP5 would increase the height of the reservoir full pool by 20.5  
23 feet and enlarge the total storage capacity in the reservoir by 634,000 acre-feet  
24 to 5.19 MAF. CP5 would increase the maximum surface area of the pool to  
25 32,300 acres. The existing temperature control device would be extended to  
26 achieve efficient use of the expanded cold-water pool. Shasta Dam operational  
27 guidelines would continue essentially unchanged, except during dry years and  
28 critical years, when 150 TAF and 75 TAF, respectively, of the increased storage  
29 capacity in Shasta Reservoir would be reserved to specifically focus on  
30 increasing M&I deliveries.

31 CP5 also would involve augmenting spawning gravel and restoring riparian,  
32 floodplain, and side-channel habitat at up to six potential locations in the upper  
33 Sacramento River. CP5 would involve constructing additional fish habitat in  
34 and along the shoreline of Shasta Lake and along the lower reaches of its  
35 tributaries, increasing recreation opportunities at Shasta Lake.

36 Implementing CP5 would result in the replacement or modification of 8 bridges  
37 and relocation of approximately 130 existing structures. The total construction  
38 cost associated with CP5 would be approximately \$1,174 million.

39 CP5 would help reduce estimated future agricultural and M&I water shortages  
40 and would increase water supply reliability in the CVP/SWP service areas by

1 increasing firm yield for agricultural and M&I deliveries, by at least 113,500  
2 acre-feet per year in dry and critical years and increasing average annual yield  
3 by about 75,900 acre-feet per year. The majority of the firm yield (i.e., 88,300  
4 acre-feet) would be for south-of-Delta agricultural and M&I deliveries. In  
5 addition, CP5 would provide hydropower benefits by increasing hydropower  
6 generation by approximately 117 GWh per year.

7 **Shasta Lake and Vicinity and Upper Sacramento River (Shasta Dam to**  
8 **Red Bluff)**

9 *Impact Socio-1 (CP5): Short-Term Increase in Population and Housing*  
10 *Demand in the Primary Study Area Resulting from Construction-Related*  
11 *Activities* According to Reclamation estimates, approximately 360 direct jobs  
12 would be created as a result of construction activities associated with CP5. All  
13 360 construction workers are expected to come from the local labor force;  
14 therefore, a short-term population increase is not expected. This impact would  
15 be less than significant.

16 This impact would be the similar to Impact Socio-1 (CP3) and would be less  
17 than significant. Mitigation for this impact is not needed, and thus not proposed.

18 *Impact Socio-2 (CP5): Short-Term Increases in Direct, Indirect, and Induced*  
19 *Employment in the Primary Study Area Related to Construction Activities*  
20 Construction activities associated with CP5 are expected to generate  
21 approximately 360 direct construction jobs, 470 indirect jobs in various  
22 construction-related support industries, and 710 induced jobs because of  
23 increased household spending in the primary study area. Individuals to fill these  
24 jobs are expected to be drawn from the local community. These new jobs would  
25 provide important but temporary employment opportunities to many  
26 unemployed construction workers in the primary study area. This impact would  
27 be beneficial.

28 This impact would be very similar to Impact Socio-2 (CP3), varying only with  
29 10 more construction workers. This impact would be beneficial. Mitigation for  
30 this impact is not needed, and thus not proposed.

31 *Impact Socio-3 (CP5): Potential for Temporary Reduction in the Labor Force*  
32 *of Related Industrial Sectors in the Primary Study Area as a Result of Direct*  
33 *Construction-Related Employment* With the creation of 360 construction jobs  
34 resulting from CP5, the potential would exist for workers from other industries  
35 to move to jobs related to construction at Shasta Dam. Because of the size of the  
36 construction industry in the primary study area and the high unemployment rate  
37 in the area, this impact would be less than significant.

38 This impact would be similar to Impact Socio-3 (CP3). CP4 would only require  
39 10 more construction workers than required for CP3, and the impact would be  
40 less than significant. Mitigation for this impact is not needed, and thus not  
41 proposed.

1                    *Impact Socio-4 (CP5): Short-Term Increases in Direct, Indirect, and Induced*  
2                    *Personal Income Paid to Employees in the Primary Study Area Hired for*  
3                    *Construction-Related Activities* Construction activities for CP5 would last 5  
4                    years, compared to 4.5 years for CP1. Additional construction activities would  
5                    be required for augmenting spawning gravel; restoring riparian, floodplain, and  
6                    side-channel habitat; and creating fish habitat in and along the shoreline of  
7                    Shasta Lake and along the lower reaches of its tributaries. Based on calculations  
8                    completed as a part of Reclamation’s IMPLAN socioeconomic model process,  
9                    more than \$95.9 million in personal income would be directly paid to  
10                    employees in the primary study area each year of construction. In addition,  
11                    more than \$53.8 million in indirect and induced income is expected to be  
12                    generated in various construction-related and other industries in the primary  
13                    study area each year of construction under CP5. The combined \$149.7 million  
14                    in personal income generated would represent an approximately 93.5 percent  
15                    increase in all annual personal income in the local economic study area. This  
16                    impact would be beneficial.

17                    This impact would be similar to Impact Socio-4 (CP3). Under CP5, more than  
18                    \$95.9 million in personal income would be directly paid to employees in the  
19                    primary study area each year of construction. In addition, more than \$53.8  
20                    million in indirect and induced income is expected to be generated in various  
21                    construction-related and other industries in the primary study area each year of  
22                    construction. The combined \$149.7 million in personal income generated would  
23                    represent an approximately 93.5 percent increase in all annual personal income  
24                    in the local economic study area.

25                    Additional construction activities would be required for augmenting spawning  
26                    gravel; restoring riparian, floodplain, and side-channel habitat; and creating fish  
27                    habitat in and along the shoreline of Shasta Lake and along the lower reaches of  
28                    its tributaries. During the 5-year construction period, more than \$748.4 million  
29                    in personal income is expected to be generated by direct, indirect, and induced  
30                    employment produced by CP5, and this would be \$17.5 million more personal  
31                    income than generated under CP3. This impact would be beneficial. Mitigation  
32                    for this impact is not needed, and thus not proposed.

33                    *Impact Socio-5 (CP5): Short-Term Increases in Sales and Profits for Businesses*  
34                    *in the Primary Study Area that Support the Construction Industry* Most of the  
35                    construction materials used for CP5 are expected to be purchased within the  
36                    primary study area. These purchases would provide the local economy with  
37                    increased sales and profits over the 5-year construction period. This impact  
38                    would be beneficial.

39                    This impact would be similar to Impact Socio-5 (CP3). During the construction  
40                    period, implementation of CP5 is expected to generate more than \$379.1 million  
41                    per year in sales and profits for construction-related and service-oriented  
42                    businesses that support the construction industry, with approximately \$234.9  
43                    million in direct income and \$144.3 in direct and induced income. CP5 would



1 generate an overall total of \$8.6 million more per year in sales and profits than  
2 CP3 for construction-related and service-oriented businesses. This impact  
3 would be beneficial. Mitigation for this impact is not needed, and thus not  
4 proposed.

5 *Impact Socio-6 (CP5): Short-Term Increase in State and Local Sales Tax*  
6 *Revenues in the Primary Study Area from Construction-Related Personal*  
7 *Income and Purchases* As stated above, implementation of CP5 is expected to  
8 result in a substantial increase in total personal income (direct, indirect, and  
9 induced) over the 5-year construction period. This additional income, in  
10 combination with construction-related purchases in the primary study area,  
11 would result in a substantial increase in local sales tax revenues from increased  
12 consumer spending in nearby cities and counties. Construction-related activities  
13 under CP5 also would be likely to result in a temporary increase in State sales  
14 and income tax revenues received from businesses and residents of the primary  
15 study area. The exact amount of State and local sales tax revenue increases  
16 would be speculative; however, this impact would be beneficial.

17 This impact would be similar to but more beneficial than Impact Socio-6 (CP3).  
18 CP5 would generate more direct, indirect, and induced personal income and  
19 more sales and profits for businesses over the construction period than CP3 (see  
20 Impacts Socio-4 (CP5) and Socio-5 (CP5), above). This impact would be  
21 beneficial. Mitigation for this impact is not needed, and thus not proposed.

22 *Impact Socio-7 (CP5): Long-Term Reduction in the Adverse Economic Effects*  
23 *of Flooding in the Primary Study Area* As a result of the added reservoir  
24 capacity created by CP5, the overall risk of flooding and its related  
25 consequences below Shasta Dam would be reduced. Although heavy rain events  
26 would continue to occur in the region and locally, and potentially increase with  
27 global climate change, the project is intended to provide greater flexibility in  
28 flood control downstream because of the increased capacity of the reservoir. As  
29 a result, less damage to existing structures and a smaller loss of potential future  
30 development would occur; this, in turn, would reduce salary and wage losses for  
31 residents of the primary study area, as well as would reduce business and  
32 personal income losses from such damage. Therefore, this impact would be  
33 beneficial.

34 This impact would be the same as Impact Socio-7 (CP3) and would be  
35 beneficial. Mitigation for this impact is not needed, and thus not proposed.

36 *Impact Socio-8 (CP5): Long-Term Increases in Direct Employment in the*  
37 *Primary Study Area Related to Project Operations* In the long term,  
38 implementation of CP5 would create at least two new maintenance-related  
39 positions at the Shasta Dam facilities. These two positions would be permanent  
40 and would continue once the 5-year construction period is completed. This  
41 impact would be minor but beneficial.

1 This impact would be the same as Impact Socio-8 (CP3) and would be minor  
2 but beneficial. Mitigation for this impact is not needed, and thus not proposed.

3 **Lower Sacramento River and Delta**

4 *Impact Socio-9 (CP5): Potential Temporary Increase in Indirect Employment in*  
5 *Construction-Related Businesses of the Lower Sacramento River and Delta*

6 Construction activities associated with CP5 would have the potential to result in  
7 a short-term increase in indirect employment within the lower Sacramento River  
8 and Delta portion of the extended study area. Depending on the location of  
9 construction materials sourced outside of the primary study area, indirect  
10 increases in employment within construction-related businesses may result in  
11 the lower Sacramento River and Delta area. This impact would be minor but  
12 beneficial.

13 This impact would be similar to Impact Socio-9 (CP3) and would be minor but  
14 beneficial. Mitigation for this impact is not needed, and thus not proposed.

15 *Impact Socio-10 (CP5): Short-Term Increases in Sales and Profits for*  
16 *Businesses in the Lower Sacramento River and Delta Area that Support the*  
17 *Construction Industry* A small amount of the construction materials used for  
18 CP5 would be purchased within the extended study area. These purchases are  
19 predicted to increase sales and profits of some businesses within the lower  
20 Sacramento River and Delta area over the 5-year construction period of CP5.  
21 This impact would be minor but beneficial.

22 This impact would be similar to Impact Socio-10 (CP3) and would be minor but  
23 beneficial. Mitigation for this impact is not needed, and thus not proposed.

24 *Impact Socio-11 (CP5): Short-Term Increase in State Sales and Income Tax*  
25 *Revenues in the Lower Sacramento River and Delta Area from Construction-*  
26 *Related Personal Income and Purchases* In addition to local tax revenues, CP5  
27 is expected to increase short-term construction-related State sales and income  
28 tax revenues received from businesses and residents of the lower Sacramento  
29 River and Delta portion of the extended study area. These additional revenues  
30 are expected to be cycled back to local government coffers through statewide  
31 programs and policies. This impact would be minor but beneficial.

32 This impact would be similar to Impact Socio-11 (CP3) and would be minor but  
33 beneficial. Mitigation for this impact is not needed, and thus not proposed.

34 *Impact Socio-12 (CP5): Long-Term Reduction in the Adverse Economic Effects*  
35 *of Flooding in the Lower Sacramento River and Delta Area* As a result of the  
36 added reservoir capacity under CP5, the overall risk of flooding and its related  
37 consequences below Shasta Dam would be reduced. Although heavy rain events  
38 would continue to occur in the region, and potentially increase with global  
39 climate change, CP5 is intended to provide greater flexibility in flood control in  
40 the lower Sacramento River and Delta area because of the increased capacity of

1 the reservoir. As a result, less damage to existing structures and a smaller loss of  
2 potential future development would occur; this, in turn, would reduce salary and  
3 wage losses for residents in and near the lower Sacramento River floodplain and  
4 the Delta resulting from these catastrophic events, as well as would reduce  
5 business and personal income losses from such damage. Therefore, this impact  
6 would be beneficial.

7 This impact would be similar to Impact Socio-12 (CP3) and would be  
8 beneficial. Mitigation for this impact is not needed, and thus not proposed.

9 **CVP/SWP Service Areas**

10 *Impact Socio-13 (CP5): Short-Term Increases in Sales and Profits for*  
11 *Businesses in the CVP and SWP Service Areas that Support the Construction*  
12 *Industry* A small amount of the construction materials used during  
13 construction under CP5 would be purchased within the extended study area,  
14 including the CVP and SWP service areas. These purchases are predicted to  
15 increase sales and profits of some businesses within the CVP and SWP service  
16 areas over the 5-year construction period of CP5. This impact would be minor  
17 but beneficial.

18 This impact would be similar to Impact Socio-13 (CP3) and would be minor but  
19 beneficial. Mitigation for this impact is not needed, and thus not proposed.

20 *Impact Socio-14 (CP5): Potential Temporary Reduction in Shasta Project*  
21 *Water or Hydropower Supplied to the CVP and SWP Service Areas during*  
22 *Construction* Implementation of CP5 may require temporarily reducing the  
23 reservoir level at critical times during the construction period. This reduction in  
24 the reservoir level could temporarily reduce the amount of water or hydropower  
25 available from the dam and related hydropower infrastructure. Should this  
26 occur, sources of replacement water or hydropower would need to be secured. If  
27 these replacement resources were substantially more expensive, a minor  
28 negative effect on water or power customers may result. This impact would be  
29 potentially significant.

30 This impact would be similar to Impact Socio-14 (CP3) and would be  
31 potentially significant. Mitigation for this impact is proposed in Section 16.3.5.

32 *Impact Socio-15 (CP5): Short-Term Increase in State Sales and Income Tax*  
33 *Revenues in the CVP and SWP Service Areas from Construction-Related*  
34 *Personal Income and Purchases* In addition to local tax revenue, CP5 is  
35 expected to increase short-term construction-related State sales and income tax  
36 revenues received from some businesses and residents of the CVP and SWP  
37 service areas. These additional revenues are expected to be cycled back to local  
38 government coffers through statewide programs and policies. This impact  
39 would be minor but beneficial.

1 This impact would be similar to Impact Socio-15 (CP3) and would be minor but  
2 beneficial. Mitigation for this impact is not needed, and thus not proposed.

3 *Impact Socio-16 (CP5): Long-Term Increase in Agricultural Income and Jobs*  
4 *in the CVP and SWP Service Areas as a Result of Improved Water Availability*  
5 *and Reliability* Based on SWAP modeling, improved water availability and  
6 reliability expected to result from implementation of CP5 would substantially  
7 increase agricultural net income in the CVP and SWP service areas. This  
8 increase in production would contribute substantially to the continuation of this  
9 already strong industry in California. This impact would be beneficial.

10 This impact would be similar to Impact Socio-16 (CP3). The increase in the  
11 availability and reliability of water associated with implementation of CP5  
12 would result in the long-term increase in indirect employment within the  
13 agricultural sector; however, this indirect increase is expected to be slightly less  
14 than under CP3. Based on the outputs of SWAP modeling, CP5 would generate  
15 an additional \$2.6 million in net income during average years and up to \$5.7  
16 million during dry years, when compared to existing conditions. In wet years,  
17 net income under CP5 is projected to increase to \$3.4 million. This impact  
18 would be beneficial. Mitigation for this impact is not needed, and thus not  
19 proposed.

20 *Impact Socio-17 (CP5): Reduction in Risk of Potential Water and Power*  
21 *Shortages (and Related Economic Activity) in the CVP and SWP Service Areas*  
22 *as a Result of Long-Term Improvements to Water and Power Supply Reliability*  
23 Implementation of CP5 would substantially increase Shasta Dam's storage  
24 capacity. As stated in Impact Socio-16 (CP5), this additional storage capacity  
25 would improve long-term water availability and reliability in the CVP and SWP  
26 service areas. Beyond increasing agricultural production, this improved  
27 availability and reliability would reduce the long-term risk of urban water and  
28 power shortages, and their related adverse economic consequences. This impact  
29 would be beneficial.

30 This impact would be the similar to the other CPs and would be beneficial.  
31 Mitigation for this impact is not needed, and thus not proposed.

### 32 **16.3.5 Mitigation Measures**

33 Table 16-1 presents a summary of mitigation measures for socioeconomics,  
34 population, and housing.

35

**Table 16-1. Summary of Mitigation Measures for Socioeconomics, Population, and Housing**

Impact		No-Action Alternative	CP1	CP2	CP3	CP4	CP5
Impact Socio-1 (No-Action): Potential for Reduced Employment Opportunities for Lower Sacramento River and Delta Area Residents	LOS before Mitigation	PS	LTS	LTS	LTS	LTS	LTS
	Mitigation Measure	None required.	None needed; thus, none proposed.				
	LOS after Mitigation	PS	LTS	LTS	LTS	LTS	LTS
Impact Socio-2 (CP1–CP5): Short-Term Increase in Population and Housing Demand in the Primary Study Area Resulting from Construction-Related Activities	LOS before Mitigation	PS	B	B	B	B	B
	Mitigation Measure	None required.	None needed; thus, none proposed.				
	LOS after Mitigation	PS	B	B	B	B	B
Impact Socio-3 (No-Action): Potential for Temporary Disruptions in Business and Industrial Activity in the Lower Sacramento River and Delta Area	LOS before Mitigation	PS	LTS	LTS	LTS	LTS	LTS
	Mitigation Measure	None required.	None needed; thus, none proposed.				
	LOS after Mitigation	PS	LTS	LTS	LTS	LTS	LTS
Impact Socio-3 (CP1–CP5): Short-Term Increases in Direct, Indirect, and Induced Employment in the Primary Study Area Related to Construction Activities	LOS before Mitigation	PS	B	B	B	B	B
	Mitigation Measure	None required.	None needed; thus, none proposed.				
	LOS after Mitigation	PS	B	B	B	B	B
Impact Socio-4 (No-Action): Potential for Reduced Employment Opportunities for Residents Within the CVP and SWP Service Areas	LOS before Mitigation	PS	LTS	LTS	LTS	LTS	LTS
	Mitigation Measure	None required.	None needed; thus, none proposed.				
	LOS after Mitigation	PS	LTS	LTS	LTS	LTS	LTS
Impact Socio-4 (CP1–CP5): Potential for Temporary Reduction in the Labor Force of Related Industrial Sectors in the Primary Study Area as a Result of Direct Construction-Related Employment	LOS before Mitigation	PS	B	B	B	B	B
	Mitigation Measure	None required.	None needed; thus, none proposed.				
	LOS after Mitigation	PS	B	B	B	B	B
Impact Socio-4 (No-Action): Potential for Temporary Disruptions in Business and Industrial Activity in the CVP and SWP Service Areas	LOS before Mitigation	PS	LTS	LTS	LTS	LTS	LTS
	Mitigation Measure	None required.	None needed; thus, none proposed.				
	LOS after Mitigation	PS	LTS	LTS	LTS	LTS	LTS
Impact Socio-4 (CP1–CP5): Short-Term Increases in Direct, Indirect, and Induced Personal Income Paid to Employees in the Primary Study Area Hired for Construction-Related Activities	LOS before Mitigation	PS	B	B	B	B	B
	Mitigation Measure	None required.	None needed; thus, none proposed.				
	LOS after Mitigation	PS	B	B	B	B	B

**Table 16-1. Summary of Mitigation Measures for Socioeconomics, Population, and Housing (contd.)**

<b>Impact</b>		<b>No-Action Alternative</b>	<b>CP1</b>	<b>CP2</b>	<b>CP3</b>	<b>CP4</b>	<b>CP5</b>
Impact Socio-5: Short-Term Increases in Sales and Profits for Businesses in the Primary Study Area that Support the Construction Industry	LOS before Mitigation	NA	B	B	B	B	B
	Mitigation Measure	None required.	None needed; thus, none proposed.				
	LOS after Mitigation	NA	B	B	B	B	B
Impact Socio-6: Short-Term Increase in State and Local Sales Tax Revenues in the Primary Study Area from Construction-Related Personal Income and Purchases	LOS before Mitigation	NA	B	B	B	B	B
	Mitigation Measure	None required.	None needed; thus, none proposed.				
	LOS after Mitigation	NA	B	B	B	B	B
Impact Socio-7: Long-Term Reduction in the Adverse Economic Effects of Flooding in the Primary Study Area	LOS before Mitigation	NA	B	B	B	B	B
	Mitigation Measure	None required.	None needed; thus, none proposed.				
	LOS after Mitigation	NA	B	B	B	B	B
Impact Socio-8: Long-Term Increases in Direct Employment in the Primary Study Area Related to Project Operations	LOS before Mitigation	NA	B	B	B	B	B
	Mitigation Measure	None required.	None needed; thus, none proposed.				
	LOS after Mitigation	NA	B	B	B	B	B
Impact Socio-9: Potential Temporary Increase in Indirect Employment in Construction-Related Businesses of the Lower Sacramento River and Delta	LOS before Mitigation	NA	B	B	B	B	B
	Mitigation Measure	None required.	None needed; thus, none proposed.				
	LOS after Mitigation	NA	B	B	B	B	B
Impact Socio-10: Short-Term Increases in Sales and Profits for Businesses in the Lower Sacramento River and Delta Area that Support the Construction Industry	LOS before Mitigation	NA	B	B	B	B	B
	Mitigation Measure	None required.	None needed; thus, none proposed.				
	LOS after Mitigation	NA	B	B	B	B	B
Impact Socio-11: Short-Term Increase in State Sales and Income Tax Revenues in the Lower Sacramento River and Delta Area from Construction-Related Personal Income and Purchases	LOS before Mitigation	NA	B	B	B	B	B
	Mitigation Measure	None required.	None needed; thus, none proposed.				
	LOS after Mitigation	NA	B	B	B	B	B
Impact Socio-12: Long-Term Reduction in the Adverse Economic Effects of Flooding in the Lower Sacramento River and Delta Area	LOS before Mitigation	NA	B	B	B	B	B
	Mitigation Measure	None required.	None needed; thus, none proposed.				
	LOS after Mitigation	NA	B	B	B	B	B
Impact Socio-13: Short-Term Increases in Sales and Profits for Businesses in the CVP and SWP Service Areas that Support the Construction Industry	LOS before Mitigation	NA	B	B	B	B	B
	Mitigation Measure	None required.	None needed; thus, none proposed.				
	LOS after Mitigation	NA	B	B	B	B	B

**Table 16-1. Summary of Mitigation Measures for Socioeconomics, Population, and Housing (contd.)**

Impact		No-Action Alternative	CP1	CP2	CP3	CP4	CP5
Impact Socio-14: Potential Temporary Reduction in Shasta Project Water or Hydropower Supplied to the CVP and SWP Service Areas during Construction	LOS before Mitigation	NA	PS	PS	PS	PS	PS
	Mitigation Measure	None required.	Mitigation Measure Socio-14: Secure Replacement Water or Hydropower During Project Construction.				
	LOS after Mitigation	NA	LTS	LTS	LTS	LTS	LTS
Impact Socio-15: Short-Term Increase in State Sales and Income Tax Revenues in the CVP and SWP Service Areas from Construction-Related Personal Income and Purchases	LOS before Mitigation	NA	B	B	B	B	B
	Mitigation Measure	None required.	None needed; thus, none proposed.				
	LOS after Mitigation	NA	B	B	B	B	B
Impact Socio-16: Long-Term Increase in Agricultural Income and Jobs in the CVP and SWP Service Areas as a Result of Improved Water Availability and Reliability	LOS before Mitigation	NA	B	B	B	B	B
	Mitigation Measure	None required.	None needed; thus, none proposed.				
	LOS after Mitigation	NA	B	B	B	B	B
Impact Socio-17: Reduction in Risk of Potential Water and Power Shortages (and Related Economic Activity) in the CVP and SWP Service Areas as a Result of Long-Term Improvements to Water and Power Supply Reliability	LOS before Mitigation	NA	B	B	B	B	B
	Mitigation Measure	None required.	None needed; thus, none proposed.				
	LOS after Mitigation	NA	B	B	B	B	B

Key:  
 B = beneficial  
 LOS = level of significance  
 LTS = less than significant  
 NA = not applicable  
 PS = potentially significant

1                    **No-Action Alternative**

2                    No mitigation measures are needed for this alternative.

3                    **CP1 – 6.5-Foot Dam Raise, Anadromous Fish Survival and Water Supply**  
4                    **Reliability**

5                    No mitigation is needed for Impacts Socio-1 (CP1) through Socio-13 (CP1) and  
6                    Impacts Socio-15 (CP1) through Socio-17 (CP1). Mitigation is provided below  
7                    for the other impact of CP1.

8                    **Mitigation Measure Socio-14 (CP1): Secure Replacement Water or**  
9                    **Hydropower during Project Construction** To address potential temporary  
10                    shortages in water or hydropower caused by reduced availability at Shasta Dam  
11                    during construction, replacement water or hydropower supplies would need to  
12                    be sourced elsewhere to maintain current service needs. Depending on the  
13                    conditions of the water or energy markets at the time of need, these replacement  
14                    resources could be more expensive than water or hydropower obtained from  
15                    Shasta Dam. The additional expense of obtaining water or hydropower  
16                    resources could potentially produce a minor negative effect on water and power  
17                    customers, if replacement of these resources is substantially more expensive.

18                    To eliminate the potential impact of project construction on water and/or  
19                    hydropower purchases, Reclamation will identify the need for replacement  
20                    water or hydropower early in project implementation and will secure such  
21                    resources at the lowest cost possible. Replacement water or hydropower would  
22                    be available from a number of sources within or external to the CVP.  
23                    Reclamation will provide these replacement resources to business and industry  
24                    in the CVP and SWP service areas at costs comparable to water or hydropower  
25                    obtained from Shasta Dam. Reclamation will provide replacement water or  
26                    hydropower at levels equal to the loss of water or hydropower caused by project  
27                    construction.

28                    Implementation of this mitigation measure would reduce Impact Socio-14  
29                    (CP1) to a less-than-significant level.

30                    **CP2 – 12.5-Foot Dam Raise, Anadromous Fish Survival and Water Supply**  
31                    **Reliability**

32                    No mitigation is needed for Impacts Socio-1 (CP2) through Socio-13 (CP2) and  
33                    Impacts Socio-15 (CP2) through Socio-17 (CP2). Mitigation is provided below  
34                    for the other impact of CP2.

35                    **Mitigation Measure Socio-14 (CP2): Secure Replacement Water or**  
36                    **Hydropower during Project Construction** This mitigation measure is  
37                    identical to Mitigation Measure Socio-14 (CP1). Implementation of this  
38                    mitigation measure would reduce Impact Socio-14 (CP2) to a less-than-  
39                    significant level.



1                   **CP3 – 18.5-Foot Dam Raise, Agricultural Water Supply Reliability and**  
2                   **Anadromous Fish Survival**

3                   No mitigation is needed for Impacts Socio-1 (CP3) through Socio-13 (CP3) and  
4                   Impacts Socio-15 (CP3) through Socio-17 (CP3). Mitigation is provided below  
5                   for the other impact of CP3.

6                   **Mitigation Measure Socio-14 (CP3): Secure Replacement Water or**  
7                   **Hydropower during Project Construction** This mitigation measure is  
8                   identical to Mitigation Measure Socio-14 (CP1). Implementation of this  
9                   mitigation measure would reduce Impact Socio-14 (CP3) to a less-than-  
10                  significant level.

11                  **CP4 – 18.5-Foot Dam Raise, Anadromous Fish Focus with Water Supply**  
12                  **Reliability**

13                  No mitigation is needed for Impacts Socio-1 (CP4) through Socio-13 (CP4) and  
14                  Impacts Socio-15 (CP4) through Socio-17 (CP4). Mitigation is provided below  
15                  for the other impact of CP4.

16                  **Mitigation Measure Socio-14 (CP4): Secure Replacement Water or**  
17                  **Hydropower during Project Construction** This mitigation measure is  
18                  identical to Mitigation Measure Socio-14 (CP1). Implementation of this  
19                  mitigation measure would reduce Impact Socio-14 (CP4) to a less-than-  
20                  significant level.

21                  **CP5 – 18.5-Foot Dam Raise, Combination Plan**

22                  No mitigation is needed for Impacts Socio-1 (CP5) through Socio-13 (CP5) and  
23                  Impacts Socio-15 (CP5) through Socio-17 (CP5). Mitigation is provided below  
24                  for the other impact of CP5.

25                  **Mitigation Measure Socio-14 (CP5): Secure Replacement Water or**  
26                  **Hydropower during Project Construction** This mitigation measure is  
27                  identical to Mitigation Measure Socio-14 (CP1). Implementation of this  
28                  mitigation measure would reduce Impact Socio-14 (CP5) to a less-than-  
29                  significant level.

30   **16.3.6 Cumulative Effects**

31                  Water reliability and electrical demand are expected to become increasingly  
32                  important issues as demand for water and electricity increases to meet the needs  
33                  of California’s growing population. Over time, water conservation and reuse  
34                  efforts will increase and water provision is expected to shift from such areas as  
35                  agricultural production to urban uses. Environmental restoration, flood control,  
36                  and hydropower generation are expected to continue in a manner similar to  
37                  existing conditions.

38                  **CP1 – 6.5-Foot Dam Raise, Anadromous Fish Survival and Water Supply**  
39                  **Reliability**

40                  **Primary Study Area** In the primary study area, effects related to increases in  
41                  population and housing during construction under CP1 would be less than

1 significant. In combination with past, present, and reasonably foreseeable future  
2 projects, this incremental contribution to overall increases in population and  
3 housing demand would not be significant or cumulatively considerable. The  
4 combined effect of these projects and the SLWRI would not induce substantial  
5 growth in population, produce a substantial burden on the existing housing  
6 stock within the local community, or require sizeable numbers of workers from  
7 outside the local area. Implementing CP1 would result in beneficial effects on  
8 employment and the labor force, business and industrial activity, and  
9 government and finance. Thus, the project would not result in a cumulatively  
10 considerable incremental contribution to significant cumulative impacts on  
11 socioeconomic resources.

12 **Extended Study Area** Without mitigation, CP1 could cause a potentially  
13 significant adverse effect on business and industrial activity in the CVP and  
14 SWP service areas. This adverse effect would be a potential temporary  
15 reduction in Shasta project water or hydropower supplied to CVP and SWP  
16 service areas during construction. With implementation of Mitigation Measure  
17 Socio-14 (CP1), adverse effects from CP1 would be fully mitigated because  
18 Reclamation would secure replacement water or hydropower during project  
19 construction. Therefore, the project would not make a cumulatively  
20 considerable incremental contribution to a significant cumulative impact related  
21 to the temporary construction-related reduction in water or hydropower supplies  
22 to the CVP and SWP service areas.

23 Implementing CP1 also would result in beneficial effects on employment and  
24 the labor force, business and industrial activity, and government and finance.  
25 Thus, the project would not result in a cumulatively considerable incremental  
26 contribution to significant cumulative impacts on socioeconomic resources.

27 ***CP2 – 12.5-Foot Dam Raise, Anadromous Fish Survival and Water Supply***  
28 ***Reliability***

29 **Primary Study Area** In the primary study area, effects related to increases in  
30 population and housing during construction under CP2 would be less than  
31 significant. In combination with past, present, and reasonably foreseeable future  
32 projects, this incremental contribution to overall increases in population and  
33 housing demand would not be significant or cumulatively considerable. The  
34 combined effect of these projects and the SLWRI would not induce substantial  
35 growth in population, produce a substantial burden on the existing housing  
36 stock within the local community, or require sizeable numbers of workers from  
37 outside the local area. Implementing CP2 would cause beneficial effects on  
38 employment and the labor force, business and industrial activity, and  
39 government and finance. Overall, the beneficial effects of CP2 in the primary  
40 study area would be greater than those of CP1. Thus, the project would not  
41 result in a cumulatively considerable incremental contribution to significant  
42 cumulative impacts on socioeconomic resources.

1           **Extended Study Area** The adverse effects of CP2 would be the same as those  
2 of CP1. With implementation of Mitigation Measure Socio-14 (CP2), adverse  
3 effects from CP2 would be fully mitigated because Reclamation would secure  
4 replacement water or hydropower during project construction. Therefore, the  
5 project would not make a cumulatively considerable incremental contribution to  
6 significant cumulative impacts related to the temporary reduction in water or  
7 hydropower supplies to the CVP and SWP service areas.

8           Implementing CP2 would result in less-than-significant impacts on population  
9 and housing and also would have beneficial impacts on employment and the  
10 labor force, business and industrial activity, and government and finance.  
11 Overall, the beneficial effects of CP2 in the extended study area would be  
12 greater than those of CP1. Thus, the project would not result in a cumulatively  
13 considerable incremental contribution to significant cumulative impacts on  
14 socioeconomic resources.

15           ***CP3 – 18.5-Foot Dam Raise, Agricultural Water Supply Reliability and***  
16 ***Anadromous Fish Survival***

17           **Primary Study Area** In the primary study area, effects related to increases in  
18 population and housing during construction under CP3 would be less than  
19 significant. In combination with past, present, and reasonably foreseeable future  
20 projects, this incremental contribution to increases in population and housing  
21 demand would not be significant or cumulatively considerable. The combined  
22 effect of these projects and the SLWRI would not induce substantial growth in  
23 population, produce a substantial burden on the existing housing stock within  
24 the local community, or require sizeable numbers of workers from outside the  
25 local area. CP3 would have beneficial impacts on employment and the labor  
26 force, business and industrial activity, and government and finance. Overall, the  
27 beneficial effects of CP3 in the primary study area would be greater than those  
28 of CP1 and CP2. Thus, the project would not result in a cumulatively  
29 considerable incremental contribution to significant cumulative impacts on  
30 socioeconomic resources.

31           **Extended Study Area** The adverse effects of CP3 would be the same as those  
32 of CP1. With implementation of Mitigation Measure Socio-14 (CP3), adverse  
33 impacts from CP3 would be fully mitigated because Reclamation would secure  
34 replacement water or hydropower during project construction. Therefore, the  
35 project would not make a cumulatively considerable incremental contribution to  
36 significant cumulative impacts related to the temporary reduction during  
37 construction in water or hydropower supplies to the CVP and SWP service  
38 areas.

39           Implementing CP3 would result in less-than-significant impacts on population  
40 and housing and also would have beneficial effects on employment and the  
41 labor force, business and industrial activity, and government and finance.  
42 Overall, the beneficial effects of CP3 in the extended study area would be  
43 greater than those of CP1 and CP2. Thus, the project would not result in a

1 cumulatively considerable incremental contribution to significant cumulative  
2 impacts on socioeconomic resources.

3 ***CP4 – 18.5-Foot Dam Raise, Anadromous Fish Focus with Water Supply***  
4 ***Reliability***

5 **Primary Study Area** In the primary study area, effects related to increases in  
6 population and housing during construction in CP4 would be less than  
7 significant. In combination with past, present, and reasonably foreseeable future  
8 projects, this incremental contribution to increases in population and housing  
9 demand would not be significant or cumulatively considerable. The combined  
10 effect of these projects and the SLWRI would not induce substantial growth in  
11 population, produce a substantial burden on the existing housing stock within  
12 the local community, or require sizeable numbers of workers from outside the  
13 local area. CP4 would have beneficial impacts on employment and the labor  
14 force, business and industrial activity, and government and finance. Overall, in  
15 the primary study area, the beneficial impacts of CP4 would be the same as  
16 those of CP3. Thus, the project would not result in a cumulatively considerable  
17 incremental contribution to cumulative significant impacts on socioeconomic  
18 resources.

19 **Extended Study Area** The adverse impacts of CP4 would be the same as  
20 those of CP1. With implementation of Mitigation Measure Socio-14 (CP4),  
21 adverse effects from CP4 would be fully mitigated because Reclamation would  
22 secure replacement water or hydropower during project construction. Therefore,  
23 the project would not make a cumulatively considerable incremental  
24 contribution to significant cumulative impacts related to the temporary  
25 reduction in water or hydropower supplies to the CVP and SWP service areas.

26 Implementing CP4 would result in less-than-significant impacts on population  
27 and housing and also would have beneficial impacts on employment and the  
28 labor force, business and industrial activity, and government and finance. In the  
29 extended study area, the beneficial impacts of CP4 for population and housing,  
30 employment, and the labor force would be the same as those of CP3. For  
31 business and industrial activity, CP4 would be more beneficial than CP3. Thus,  
32 the project would not result in a cumulatively considerable incremental  
33 contribution to significant cumulative impacts on socioeconomic resources.

34 ***CP5 – 18.5-Foot Dam Raise, Combination Plan***

35 **Primary Study Area** In the primary study area, effects related to increases in  
36 population and housing during construction under CP5 would be less than  
37 significant. In combination with past, present, and reasonably foreseeable future  
38 projects, this incremental contribution to increases in population and housing  
39 demand would not be significant or cumulatively considerable. The combined  
40 effects of these projects and the SLWRI would not induce substantial growth in  
41 population, produce a substantial burden on the existing housing stock within  
42 the local community, or require sizeable numbers of workers from outside the  
43 local area. CP5 would cause beneficial impacts on employment and the labor

1 force, business and industrial activity, and government and finance. Overall, in  
2 the primary study area, the beneficial effects of CP5 would be the similar to  
3 those of CP3. Thus, the project would not result in a cumulatively considerable  
4 incremental contribution to significant cumulative impacts on socioeconomic  
5 resources.

6 **Extended Study Area** The adverse effects of CP5 would be the same as those  
7 of CP1. With implementation of Mitigation Measure Socio-14 (CP5), adverse  
8 effects from CP5 would be fully mitigated because Reclamation would secure  
9 replacement water or hydropower during project construction. Therefore, the  
10 project would not make a cumulatively considerable incremental contribution to  
11 significant cumulative impacts related to the temporary reduction during  
12 construction in water or hydropower supplies to the CVP and SWP service  
13 areas.

14 Implementing CP5 would result in less-than-significant impacts on population  
15 and housing and also would have beneficial impacts on employment and the  
16 labor force, business and industrial activity, and government and finance.  
17 Overall, in the extended study area, the beneficial effects of CP5 would be  
18 similar to those of CP3. Thus, the project would not result in a cumulatively  
19 considerable incremental contribution to significant cumulative impacts on  
20 socioeconomic resources.

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# 1 Chapter 17

## 2 Land Use and Planning

### 3 17.1 Affected Environment

4 This chapter describes the affected environment related to land uses and  
5 planning for the dam and reservoir modifications proposed under SLWRI action  
6 alternatives.

7 Because of the potential influence of the proposed modification of Shasta Dam  
8 and water deliveries over a large geographic area, the SLWRI includes both a  
9 primary study area and an extended study area. The primary study area has been  
10 further divided into Shasta Lake and vicinity and the upper Sacramento River  
11 (Shasta Dam to Red Bluff). The extended study area has been further divided  
12 into the lower Sacramento River and Delta and the CVP/SWP service areas.

13 The setting for land uses and planning in the Shasta Lake and vicinity portion of  
14 the primary study area consists of the portion of Shasta County north of Shasta  
15 Dam. This area encompasses Shasta Lake, lands surrounding the lake, and parts  
16 of the Pit River, Squaw Creek, McCloud River, and Sacramento River  
17 watersheds. Land use and planning in this area are influenced by land  
18 ownership, the presence of rural lakeside communities, and topography.

19 The setting for land uses and planning in the upper Sacramento River portion of  
20 the primary study area consists of the portion of Shasta County south of Shasta  
21 Dam and Tehama County. The incorporated cities of Shasta Lake, Redding,  
22 Anderson, and Red Bluff, all located along the Interstate 5 (I-5) corridor,  
23 establish urban settings in the otherwise rural upper Sacramento Valley. The  
24 upper Sacramento Valley is characterized by rolling hills with mountains to the  
25 north, east, and west. Land use and planning in this area are influenced by land  
26 ownership, historic land use patterns, topography, and population densities.

27 The land use and planning setting for the extended study area consists of 24  
28 counties downstream from the Red Bluff Pumping Plant and encompasses all  
29 areas served by the CVP and the SWP. Land use and planning in the extended  
30 study area are influenced by the same factors identified for the upper  
31 Sacramento River study area. The type and focus of land use and planning may  
32 vary, however, in the large urban areas located in the extended study area.

1 **17.1.1 Land Use**

2 ***Shasta Lake and Vicinity***

3 Land uses in the Shasta Lake and vicinity portion of the primary study area  
4 consist primarily of open space and other land uses that support recreational  
5 activities in the Shasta Unit of the Whiskeytown-Shasta-Trinity National  
6 Recreation Area (NRA). The Shasta-Trinity National Forest (STNF) manages  
7 the Shasta Unit of the NRA. Federally managed lands in the NRA total 235,740  
8 acres, including Shasta Lake; lands held in private ownership total 10,347 acres.  
9 A small area around Shasta Dam is administered by Reclamation. In addition,  
10 the California Department of Transportation (Caltrans) manages the I-5 corridor  
11 and the Union Pacific Railroad (UPRR) manages the rail corridor that crosses  
12 the primary study area (Figure 17-1).

13 The *Shasta-Trinity National Forest Land and Resource Management Plan*  
14 (LRMP) (USFS 1995) specifies several land allocations for National Forest  
15 System (NFS) lands managed by the Shasta Lake Ranger District within and  
16 adjacent to the Shasta Unit of the NRA. NFS lands in the primary study area  
17 are allocated as Late Successional Reserves (LSR), Riparian Reserves,  
18 Administratively Withdrawn Areas, and Matrix.

19 Late Successional Reserves and Administratively Withdrawn Areas each  
20 account for 20 percent of the land use designations in the NRA. Riparian  
21 Reserves, the largest land use designation in the NRA, are located in areas along  
22 rivers, streams, lakes, and wetlands, including the area inundated by Shasta  
23 Lake. Riparian Reserves were established to provide connectivity between  
24 LSRs and the Matrix throughout the NRA.

25 Approximately 25 percent of the land managed by the STNF within the  
26 boundary of the NRA is designated as either Administratively Withdrawn Areas  
27 or Matrix. Lands allocated as withdrawn were identified in the STNF LRMP as  
28 management emphasis areas where scheduled timber harvest is precluded. The  
29 Matrix consists of other federal lands outside the categories described above.

30 STNF LRMP direction for Administratively Withdrawn Areas, including the  
31 Shasta Unit of the NRA, are to manage them for healthy forest stands,  
32 maintenance of wildlife habitat, good scenic quality, public health and safety,  
33 and reduction of fire hazards. Vegetation management within the NRA does  
34 not preclude silvicultural prescriptions (e.g., tree removal, prescribed fire, etc.).



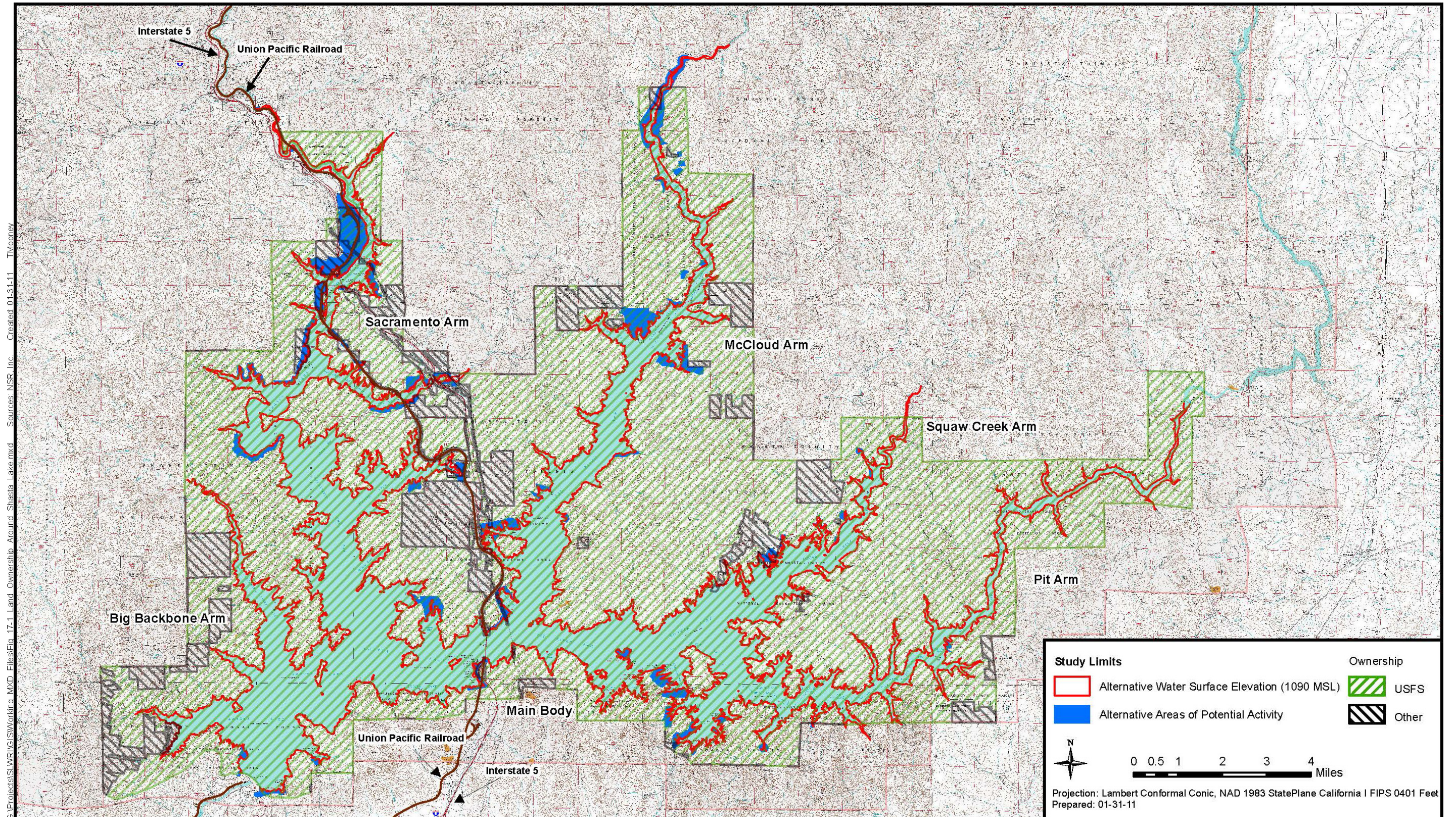


Figure 17-1. Land Ownership Around Shasta Lake

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1 Developed recreational and commercial land uses occupy 2 percent of the land  
2 managed by the STNF within the Shasta Unit of the NRA. Recreational use in  
3 the NRA exceeds 2 million visitor days annually. Water-oriented activities, such  
4 as boating, fishing, waterskiing, and houseboating, are the main attractions.  
5 Marinas that currently operate on Shasta Lake include Antlers, Sugarloaf,  
6 Shasta, Lakeview, Holiday Harbor, Packers Bay, Bridge Bay, Silverthorn, Jones  
7 Valley, and Digger Bay. Other recreational land uses include hiking, camping,  
8 picnicking, and off-highway vehicle activities. A planning permit was issued by  
9 the STNF to decommission Digger Bay and construct a new marina at Turntable  
10 Bay, but the permit was not exercised and has since been revoked.

11 Commercial land uses in the NRA include resorts, marinas, campgrounds,  
12 restaurants, motels, grocery stores, and service stations. Resorts are sometimes  
13 operated as stand-alone entities, but are more typically operated in conjunction  
14 with a marina. Some resorts on Shasta Lake must move their docks substantial  
15 distances from their land-based facilities during periods of low water levels.

16 USFS operates recreation residence tracts at Salt Creek, Silverthorn, Campbell  
17 Creek, and Didallas Creek; these tracts combined contain 160 privately owned  
18 cabins on National Forest System lands. USFS policy is to manage these tracts  
19 and residences for individual recreational use and to keep the areas as close as  
20 possible to their natural state. Only minimal improvements are permitted, and  
21 structures must blend into the natural environment.

22 Mining and grazing do not take place in the NRA. There are no grazing permits  
23 authorized for the Shasta Unit of the NRA, primarily because of a lack of  
24 suitable range. Federal lands in the NRA, except those with valid existing  
25 rights, were withdrawn from mineral entry by the legislation that created the  
26 NRA. Reclamation and USFS conducted validity determinations on most of the  
27 claims existing at that time and contested the majority of them based on the  
28 absence of a valid discovery. There are five claims in the NRA that predate the  
29 withdrawal. The lands covered by these claims remain open to mineral leasing,  
30 but there are no approved operating plans for these claims. Hard rock minerals  
31 in the NRA are available for prospecting, exploration, and development under  
32 solid mineral leasing regulations (36 Code of Federal Regulations (CFR)  
33 Subpart 3583). Authorization for this land use requires permits and leases  
34 subject to approval by the Secretary of Agriculture and terms and conditions of  
35 the USFS to protect the values of the NRA.

36 Land uses on privately owned lands in the NRA generally consist of  
37 commercial, recreational, and residential land uses associated with the NRA.  
38 Approximately 20 percent of the privately held lands in the NRA are developed.  
39 Commercial development consists primarily of service industries supporting  
40 residents and recreational visitors.

41 Residential land uses are typically characterized as low density and rural.  
42 Established small communities along Shasta Lake include Lamoine, Lakehead,

1 Lakeshore, and Sugarloaf, which are located on the Sacramento Arm of Shasta  
2 Lake. Farther south is the residential community of O'Brien, which is located  
3 between the Sacramento and McCloud arms near I-5.

4 The McCloud River, which flows into Shasta Lake in the primary study area, is  
5 eligible for listing as Wild and Scenic under the Federal Wild and Scenic Rivers  
6 Act (WSRA). In addition, although it is not State-listed as Wild and Scenic, the  
7 McCloud River receives certain protections under the California Public  
8 Resources Code (PRC), Section 5093.542, established through enactment of the  
9 California Wild and Scenic Rivers Act, as amended (Sections 5093.50–  
10 5093.70). The effects of the proposed enlargement of Shasta Lake on the  
11 McCloud River are discussed in Chapter 25 of this DEIS.

### 12 ***Upper Sacramento River (Shasta Dam to Red Bluff)***

13 Land uses in the upper Sacramento River area consist of urban, residential,  
14 municipal and industrial, and agricultural uses. Urban development is located in  
15 the valley and is concentrated along the transportation corridors provided by I-5,  
16 State Route 273, and the UPRR. Incorporated cities located in the valley along  
17 I-5 in the upper Sacramento River study area are the cities of Shasta Lake,  
18 Redding, Anderson, and Red Bluff. Cottonwood, an unincorporated community  
19 located along the I-5 corridor, also has residential and commercial development.

20 Small rural communities characterize development patterns 5-8 miles east and  
21 west of the I-5 corridor. Many of these communities have their origins in the  
22 early settlement of Shasta County and Tehama County, as evidenced by the  
23 agriculture, grazing, and timber operations typical of the upland areas. These  
24 communities usually consist of small community centers surrounded by vast  
25 tracts of fields and forest that are dotted with home sites (Shasta County 2004).

26 The northern, western, and eastern portions of Shasta County are relatively  
27 uninhabited because the lands in these areas are managed by USFS for timber,  
28 wildlife, and wilderness uses. Lands managed by USFS in the western and  
29 southeastern portions of Tehama County are also relatively uninhabited.

30 The National Park Service manages lands in the upper Sacramento River study  
31 area, including the Whiskeytown Unit of the NRA, west of Keswick, and  
32 Lassen Volcanic National Park, in the northeastern corner of Tehama County.  
33 The U.S. Department of the Interior, Bureau of Land Management (BLM)  
34 manages the 12,194-acre Sacramento River Bend Management Area on the east  
35 side of the Sacramento River northeast of Red Bluff.

### 36 ***Lower Sacramento River and Delta***

37 Land uses in the extended study area vary greatly because of differences in  
38 population, economy, and environment. Land uses in the Sacramento River  
39 valley are principally agricultural and open space, with urban development  
40 focused around the state capital in the Sacramento metropolitan area. The  
41 primary private land use in the region is agriculture. As of 1997, the Sacramento

1 Valley area contained more than 11,000 farms on about 4.3 million acres. Urban  
2 development has occurred along major highway corridors, primarily in  
3 Sacramento, Placer, El Dorado, Yolo, Solano, and Sutter counties, and has  
4 caused some agricultural land to be taken out of production. For those lands that  
5 remain agricultural, soil conditions allow a wide variation in crop mix.

6 The American River is in the lower Sacramento River and Delta portion of the  
7 extended study area. Two sections of the American River, the North Fork  
8 American River from its source in the Sierra Nevada to the Iowa Hill Bridge  
9 near Colfax and the lower American River from Nimbus Dam to the river's  
10 confluence with the Sacramento River in the city of Sacramento, are listed as  
11 Wild and Scenic under the Federal WSRA and the PRC.

12 The listed segment of the North Fork American River is designated as a wild  
13 river under the Federal WSRA and the PRC. The listed segment is above any  
14 regulated reaches and is not under the control of the CVP or SWP. The  
15 downstream end of the listed segment is more than 70 river miles and 50 air  
16 miles upstream from the confluence with the Sacramento River and is thus too  
17 far away to be affected by any hydraulic changes in the Sacramento River.

18 The lower American River is regulated by Folsom Dam, which is approximately  
19 7 miles upstream from Nimbus Dam. Both Shasta Dam and Folsom Dam  
20 release water in accordance with their operational requirements, including  
21 releases to maintain water quality for fisheries, municipal use, and agricultural  
22 use, and for exports to the San Joaquin Valley. Both dams have operational  
23 requirements for the sections of the Sacramento and lower American rivers  
24 above their confluence, and they also have shared operational requirements for  
25 the Sacramento River and Delta below the confluence. Therefore, operational  
26 changes at one dam could require operational changes at the other. For example,  
27 reduced releases from Shasta Dam could require increased releases from  
28 Folsom Dam to meet flow requirements in the lower Sacramento River and  
29 Delta.

30 The lower American River is designated as a recreational river under the  
31 Federal WSRA and the PRC. Fishing and boating, including rafting and  
32 canoeing, are the primary recreational activities on the river. In addition, much  
33 of the lower American River's south shore is part of the American River  
34 Parkway. Joggers, bicyclists, walkers, and families use the riverside trails and  
35 beaches of this extensive park system.

### 36 **CVP/SWP Service Areas**

37 The CVP, operated by Reclamation, is the largest water storage and delivery  
38 system in California, covering 29 of the state's 58 counties. Most of the CVP  
39 service area is in the Central Valley, and about 90 percent of the south-of-Delta  
40 contractual delivery is for agricultural uses (Reclamation 2007).

1 Most of the population of the CVP service area is concentrated within urban  
2 areas. The CVP service area includes various municipal and industrial water  
3 contractors and water districts that serve portions of the Sacramento and  
4 Stockton metropolitan areas and the San Francisco Bay Area. Outside these  
5 population centers, most of the CVP service area is rural, with irrigated  
6 agriculture the predominant land use and economic driver (Reclamation 2007).

7 SWP water is delivered to contracting agencies in Northern California, the San  
8 Francisco Bay Area, the Central Coast, San Joaquin Valley, and Southern  
9 California.

10 Land uses in the CVP/SWP service areas vary and include agricultural,  
11 municipal and industrial, commercial, open space, grazing, and timber  
12 production.

### 13 **17.1.2 Planning**

#### 14 ***Shasta Lake and Vicinity***

15 **Federal Land Use Planning** Federal lands are not subject to county or city  
16 general plans. Land use planning direction for the NRA is guided by Federal  
17 legislation (including 36 CFR Part 292, Subpart B), Forest Service Directives,  
18 and management direction found in the STNF LRMP. BLM manages a number  
19 of public lands west of the NRA in the vicinity of the Chappie-Shasta Off-  
20 Highway Vehicle Area and along the Sacramento River corridor downstream  
21 from Shasta Dam.

22 **Shasta-Trinity National Forest Land and Resource Management Plan** The  
23 STNF LRMP is based on three broad management strategies: preservation,  
24 biodiversity, and sustainable development for people. The objectives of the  
25 STNF LRMP are to:

- 26 • describe the desired conditions of NFS lands and resources;
- 27 • identify strategies to maintain or achieve those conditions;
- 28 • identify land areas as generally suitable or unsuitable for various uses;
- 29 • identify the guidelines for projects and activities; and
- 30 • identify areas with special or unique characteristics.

31 Projects and activities must be consistent with the applicable plan components.  
32 The STNF LRMP provides management direction at four integrated levels: (1)  
33 forest-wide direction, (2) land allocations and standards and guidelines, (3)  
34 management prescription direction, and (4) management area direction.

35 In addition to the land allocations described in the preceding section (LSRs,  
36 Riparian Reserves, Administratively Withdrawn Areas, and Matrix), there are a

1 number of goals and associated standards and guidelines applicable to the  
2 SLWRI project with respect to NFS lands in the primary study area. Goals that  
3 describe the desired future condition of the STNF include:

- 4 • Lands
  - 5 – Plan for long-range land ownership adjustments that support
6 resource objectives.
- 7 – Provide for continued use and new development of hydroelectric
8 facilities.

9 Six land allocations apply to the STNF: Congressionally Reserved Areas  
10 (Wilderness Areas), LSRs, Administratively Withdrawn Areas, Riparian  
11 Reserves, Matrix, and Adaptive Management Areas (USFS 1995). There are no  
12 Congressionally Reserved Areas and Adaptive Management Areas in the  
13 primary study area so these allocations are not considered in this analysis.

14 The STNF LRMP requires each type of land use to be managed in accordance  
15 with applicable management prescriptions and the respective standards and  
16 guidelines pertaining to both land allocations and unique management areas.  
17 Lands allocated as LSRs, for example, have specific management objectives  
18 and standards and guidelines for air quality, biological diversity, fire and fuels,  
19 etc. The applicable management prescriptions for the four land allocations in the  
20 primary study are discussed below.

- 21 • **Late Successional Reserves** – LSRs have been established to protect  
22 and enhance conditions of late-successional and old-growth forest  
23 ecosystems and to ensure the support of related species, including the  
24 northern spotted owl. The applicable management prescription is:
    - 25 – Provide special management for Late Successional Reserves and
26 Threatened, Endangered and Selected Sensitive Species that are
27 primarily dependent on late seral stage conditions.
- 28 • **Administratively Withdrawn Areas** – These areas are identified in  
29 the STNF LRMP and include recreation and visual areas, backcountry,  
30 and other areas where management emphasis precludes scheduled  
31 timber harvesting. The applicable management prescriptions are:
  - 32 – **Unroaded Non-Motorized Recreation** – Provide for semi-  
33 primitive non-motorized recreation opportunities in unroaded areas  
34 outside existing wilderness areas while maintaining predominantly  
35 natural-appearing areas with only subtle modifications.
  - 36 – **Limited Roaded Motorized Recreation** – Provide for semi-  
37 primitive motorized recreation opportunities while maintaining  
38 predominantly natural-appearing areas with some modifications.

- 1                                   – **Roaded, High Density Recreation** – Provide areas that are  
2                                   characterized by a substantially modified natural environment.
- 3                                   – **Special Area Management** – Provide for protection and  
4                                   management of special interest areas and research natural areas.
- 5                                   – **Heritage Resource Management** – The primary theme of this  
6                                   prescription is to protect designated cultural resource values,  
7                                   interpret significant archaeological and historical values for the  
8                                   public, and encourage scientific research of these selected  
9                                   properties.
- 10                               • **Riparian Reserves** – Provide an area along streams, wetlands, ponds,  
11                               lakes, and unstable and potentially unstable areas where riparian-  
12                               dependent resources receive primary emphasis. The applicable  
13                               management prescription is:
- 14                                   – **Riparian Management** – Maintain or enhance riparian areas,  
15                                   wildlife and fisheries habitat, and water quality by emphasizing  
16                                   streamside and wetland management.
- 17                               • **Matrix** – Includes Federal lands outside the categories of the  
18                               designated areas listed above. There are no Matrix lands in the NRA.  
19                               Matrix lands are where most timber harvest would occur and where  
20                               standards and guidelines are in place to ensure appropriate conservation  
21                               of ecosystems as well as provide habitat for rare and lesser known  
22                               species. The applicable management prescriptions are:
- 23                                   – **Roaded Recreation** – Provide for an area where there are moderate  
24                                   evidences of the sights and sounds of humans.
- 25                                   – **Wildlife Habitat Management** – The primary purpose of this  
26                                   prescription is to maintain and enhance big game, small game,  
27                                   upland game bird, and nongame habitat to provide adequate hunting  
28                                   and viewing opportunities.

29                               The STNF LRMP provides another more specific layer of land use planning  
30                               guidance for the NRA: the *Management Guide: Shasta and Trinity Units of the*  
31                               *Whiskeytown-Shasta-Trinity NRA* (USFS 1996). The Land Use and Ownership  
32                               section of this document provides the following guidance for NRA lands  
33                               managed by the STNF:

- 34                               • Those private lands that would enhance outdoor recreation  
35                               opportunities and/or the conservation of scenic, scientific, historic, and  
36                               other values contributing to the public enjoyment of the NRA should be  
37                               acquired as opportunities arise.



- 1                   • Land exchanges will be pursued in accordance with the Forest Land  
2                   Adjustment Guide. Lands directly adjacent to the shoreline will have  
3                   the highest priority.
- 4                   • Lands with significant known pollution sources arising from a history  
5                   of mining discharge will not be acquired.
- 6                   • Coordination will take place with Shasta County to allow those private  
7                   land developments and resource production proposals that will  
8                   maintain or enhance NRA values, and to disallow or phase out private  
9                   land uses that detract from those values.
- 10                  • Coordination will take place with county, State, and other Federal  
11                  agencies on development, management, and regulatory oversight of  
12                  recreation opportunities and facilities to ensure consistency with NRA  
13                  objectives.
- 14                  • Planning will take place with owners and managers of travel and utility  
15                  corridors through the NRA (railroad, highway, and major power lines)  
16                  to minimize the visual impacts of these corridors on the aesthetic value  
17                  of the NRA.

18                  The STNF coordinates with Shasta County to ensure that private development  
19                  in the NRA maintains or enhances NRA values through local zoning  
20                  regulations.

21                  **U.S. Bureau of Land Management Resource Management Plan** BLM  
22                  manages a number of public lands west of the NRA in the vicinity of the  
23                  Chappie-Shasta Off Highway Vehicle Area and along the Sacramento River  
24                  corridor downstream from Shasta Dam. The study area falls under two BLM  
25                  districts (Northern California and Central California) and the resource  
26                  management plans (RMP) of three BLM field offices: Redding, Ukiah, and  
27                  Mother Lode (BLM 2006). The purpose of BLM's RMPs is to provide an  
28                  overall direction for managing and allocating public resources in each planning  
29                  area. Planning issues addressed in the RMPs include land tenure adjustments,  
30                  such as land acquisition, exchange, and sale; recreation management; access;  
31                  and forest management, including harvesting, herbicide use, and special-status  
32                  species.

33                  BLM's Redding RMP (BLM 1993) provides guidance for the management of  
34                  cultural resources, fire, grazing, minerals, vegetation, water quality, wildlife and  
35                  fish habitats, and other resources and issues in Shasta County. The RMP was  
36                  amended by the 1994 Record of Decision for the *Northwest Forest Plan* (Final  
37                  Supplemental EIS for Amendments to Forest Service and Bureau of Land  
38                  Management Planning Documents within the Range of the Northern Spotted  
39                  Owl). This amendment required preparation of a Watershed Analysis prior to  
40                  initiating BLM activities. As a party to the *Northwest Forest Plan*, BLM, like

1 USFS, is also required to ensure that projects are consistent with the Aquatic  
2 Conservation Strategy and other management direction specified in the 1994  
3 Record of Decision for the *Northwest Forest Plan*.

4 The Redding RMP governs land use on BLM lands, including lands in the  
5 Sacramento River Management Area. The goal of the lands program of the  
6 Redding Field Office is to transform the scattered land base of the Redding  
7 Resource Area into consolidated resource management units to meet the needs  
8 of public land users. The RMP includes the following management guidance for  
9 its land program:

- 10 • All lands identified for transfer to another agency or qualified  
11 organization are for long-term stewardship by the receiving entity.
- 12 • All land acquisitions will be through exchange, purchase, or donation.  
13 Acquisitions will be from willing sellers for available unimproved  
14 property. In all acquisitions, BLM will strive to gain the local support  
15 and understanding for the action.
- 16 • All land identified for disposal through exchange, Recreation and  
17 Public Purposes Act transfer, or sale meets the criteria set forth in the  
18 Federal Land Policy and Management Act of 1976.
- 19 • Land use authorizations (rights-of-way, leases, permits) will continue  
20 to be issued on a case-by-case basis and in accordance with decisions  
21 established in the RMP. Applications for land use authorizations which  
22 reduce the marketability of an exchange parcel will not be authorized.
- 23 • Rights-of-way will be issued to promote the maximum utilization of  
24 existing rights-of-way routes, including joint use whenever possible.

25 **County Land Use Planning** Land-use planning on non-Federal land is the  
26 province of local governments in California. All cities and counties in  
27 California are required by the State to adopt a general plan establishing goals  
28 and policies for long-term development, protection from environmental hazards,  
29 and conservation of identified natural resources (California Government Code  
30 Section 65300). General plans lay out the pattern of future residential,  
31 commercial, industrial, agricultural, open-space, and recreational land uses on  
32 non-Federal land within a community. To facilitate implementation of planned  
33 growth patterns, general plans identify goals and/or policies to establish land  
34 use patterns.

35 Local governments implement general plans by adopting zoning, subdivision,  
36 grading, and other ordinances. Zoning ordinances identify specific types of land  
37 uses that may be allowed on a given site and establish specific development  
38 standards. Zoning regulations vary from jurisdiction to jurisdiction. However,  
39 typical standards promulgated in zoning ordinances include the siting of

1 structures relative to parcel boundaries, architectural design (including height  
2 limitations), and the percentage of building coverage allowed relative to the  
3 overall square footage of a parcel.

4 The *Shasta County General Plan* (Shasta County 2004) provides planning  
5 guidance for privately owned land in Shasta County. Land use directives are  
6 provided in the form of goals, policies, objectives, standards, and guidelines.  
7 The following land uses described in the general plan are present in the Shasta  
8 Lake and vicinity portion of the primary study area:

- 9 • **Rural Residential** – Encompasses areas that receive minimal urban  
10 services, usually in or near a rural community center and areas with no  
11 urban services that are located in areas of the county characterized by  
12 one or more of the following conditions:
  - 13 – Severe limitations on septic tank use
  - 14 – Uncertain long-term availability of water
  - 15 – Proximity to lands categorized as timber, grazing, or crop lands
  - 16 – Remoteness from urban, town, and rural community centers
  - 17 – Extreme wildland fire hazard
  - 18 – Inaccessibility via county-maintained roads
- 19 • **Existing Residential** – This designation may be applied to residential  
20 areas that existed before 1984 and that do not fit the land use  
21 designation or density applied to surrounding properties.
- 22 • **Mixed Use** – This category recognizes that in a rural setting the strict  
23 segregation of different land use types, which is typically found in  
24 urban environments, is neither necessary nor practical. At this scale,  
25 conflicts that may result from the intermixing of land uses may be  
26 addressed by Shasta County zoning and development standards related  
27 to screening setbacks and architectural design.
- 28 • **Commercial Recreational** – This designation provides opportunities  
29 for the development of privately owned lands characterized by the  
30 natural environment for the purpose of providing commercial  
31 recreation activities that use and provide for the enjoyment of the  
32 natural environment. Examples of commercial recreation include  
33 campgrounds, fishing and hunting clubs, dude ranches, boating  
34 facilities, and recreational vehicle parks. Other uses such as a restaurant  
35 or small grocery store may be permitted when accessory to, supportive  
36 of, and compatible with the recreation activity.

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- **Natural Resources Protection**
  - **Community Parks** – Provides for large-scale community recreation facilities
  - **Habitat** – Provides for protection of significant wildlife habitat resources

Shasta County land use actions and decisions on non-Federal land in the NRA are subject to STNF review and approval pursuant to 36 CFR Part 292, Subpart B.

***Upper Sacramento River (Shasta Dam to Red Bluff)***

Land use planning in the upper Sacramento River area consists of general plans adopted by Shasta and Tehama counties and the cities of Shasta Lake, Redding, Anderson, and Red Bluff. BLM lands in this area are managed in accordance with the Redding RMP, discussed in the “Regulatory Framework” section below.

**Local Land Use Planning**

*Shasta County* The *Shasta County General Plan (2004)* designates the following land uses along the Sacramento River from Shasta Dam south to the Tehama County line:

- Rural residential
- Greenway
- Habitat resource
- Natural habitat
- Agricultural – cropland
- Agricultural – small-scale crops, grazing
- Mineral resources

*Tehama County* The *Tehama County General Plan Update 2009–2029 (2009)* designates the following land uses along the Sacramento River from the Shasta County line in the north to Red Bluff:

- Habitat Resources
- Valley Floor Agriculture
- Public Facility
- Rural Residential–Small Lot
- Suburban Residential

1                    *City of Shasta Lake* The *City of Shasta Lake General Plan* was adopted in  
2                    1999. The general plan designates the following land uses along Shasta Dam  
3                    Boulevard, the primary roadway leading up to Shasta Dam:

- 4                    • Community park
- 5                    • 100-year floodplain
- 6                    • Public facilities
- 7                    • Commercial
- 8                    • Mixed use
- 9                    • Rural residential (1 unit/2 acres, 1 unit/5 acres)
- 10                  • Suburban residential (3 units/acre)
- 11                  • Urban residential (10 units/acre)
- 12                  • Urban residential – High (20 units/acre)

13                  *City of Redding* The City of Redding adopted an updated general plan in 2000  
14                  (City of Redding 2000). The general plan designates the following land uses  
15                  along the Sacramento River within the city limits and sphere of influence:

- 16                  • Greenway
- 17                  • Park, Park-Golf
- 18                  • Public Facility; Public Facility-School
- 19                  • Recreational
- 20                  • General Office
- 21                  • General Commercial
- 22                  • Neighborhood Commercial
- 23                  • Residential (2–3.5, 3.5–6, 6–10 units/acre)
- 24                  • Critical Mineral Resource Overlay
- 25                  • Mixed Use Neighborhood Overlay

26                  *City of Anderson* The City of Anderson released its updated general plan in  
27                  May 2007 (City of Anderson 2007). The general plan designates the following  
28                  land uses along the Sacramento River within the city limits and sphere of  
29                  influence:

- 30                  • Commercial
- 31                  • Industrial

- 1                   • Public/Quasi-Public
- 2                   • Medium-Density Residential
- 3                   • Rural Residential/Rural Estate

4                   *City of Red Bluff* The City of Red Bluff most recently amended its General  
5 Plan Land Use Element in 1993. The general plan designates the following land  
6 uses along the Sacramento River within the city limits and sphere of influence:

- 7                   • Primary Floodplain
- 8                   • Exclusive Agriculture
- 9                   • General Commercial
- 10                  • Central Business Districts
- 11                  • Single-Family Residential
- 12                  • General and Neighborhood Apartment Districts
- 13                  • General Industrial
- 14                  • Public Agency District
- 15                  • Park

16                   ***Lower Sacramento River and Delta***

17 The lower Sacramento River and Delta are within the planning jurisdiction of  
18 Butte, Colusa, Contra Costa, Glenn, Sacramento, Solano, Sutter, Yolo, and  
19 Yuba counties. The largest cities in this region are Antioch, Chico, Davis,  
20 Fairfield, Martinez, Marysville, Pittsburg, Sacramento, Vacaville, Vallejo, West  
21 Sacramento, and Woodland. Each of these entities currently has adopted general  
22 plans and zoning ordinances. Land use planning documents are adopted by  
23 Federal agencies for federally managed lands in the lower Sacramento River  
24 and Delta areas.

25                   ***CVP/SWP Service Areas***

26 The CVP extends from the Cascade Range near Redding in the north to the  
27 Tehachapi Mountains near Bakersfield in the south. The CVP serves farms,  
28 homes, and industry in California's Central Valley as well as major urban  
29 centers in the San Francisco Bay Area. SWP contractors are in the southern San  
30 Joaquin Valley, Central Coastal area, and Southern California. The CVP and  
31 SWP service areas include portions of the primary and extended study areas.  
32 CVP water irrigates more than 3 million acres of farmland and provides  
33 drinking water to nearly 2 million consumers. SWP deliveries are 70 percent  
34 urban and 30 percent agriculture, serving 20 million Californians and more than  
35 600,000 irrigated acres, respectively. Each of the counties and incorporated  
36 cities in the CVP and SWP service areas has adopted general plans and zoning

1 ordinances. Federally managed lands in the service areas are managed in  
2 accordance with land use and planning documents similar to the STNF LRMP  
3 and BLM's RMP, and military installations located in the service areas have  
4 their own planning processes.

## 5 **17.2 Regulatory Framework**

### 6 **17.2.1 Federal**

7 Federal land use policies apply only to actions on, or affecting the uses of,  
8 Federal lands. Federal lands in the primary study area consist of the following:

- 9 • National Forest lands managed by STNF around Shasta Lake
- 10 • Lands along the Sacramento River just south of Shasta Dam managed  
11 by Reclamation
- 12 • Lands managed by BLM along the Sacramento River south of Shasta  
13 Dam as far downstream as Red Bluff

14 Entry upon or use of these Federally administered lands would require approval  
15 from the appropriate Federal entity(ies).

#### 16 ***Federal Land Policy and Management Act***

17 The Federal Land Policy and Management Act was enacted to change the  
18 Federal public lands policy from disposal to retention. The act directs Federal  
19 agencies to apply land use principles that emphasize conservation; these include  
20 the principles of multiple use and sustained yield land management policies.  
21 The Federal Land Policy and Management Act consolidated and articulated  
22 BLM's management responsibilities and applies primarily to this Federal land  
23 management agency. Title V of the Federal Land Policy and Management Act  
24 also granted the Secretary of the Interior and the Secretary of Agriculture the  
25 authority to issue rights-of-way for various uses, including reservoirs.

#### 26 ***Code of Federal Regulations***

27 USFS personnel administer their responsibilities for regulating use and  
28 protecting National Forest lands under Title 36 of the CFR and sections of titles  
29 16, 18, and 21. Public services directives from the code are integrated into the  
30 STNF LRMP and include the following topics: fire and fuels management,  
31 facilities management, law enforcement, and land management.

#### 32 ***Shasta-Trinity National Forest Land and Resource Management Plan***

33 The STNF LRMP is a forest-wide land use plan developed to guide resource  
34 management on STNF lands. Six broad categories are used to define  
35 management strategies. The management strategies (known as land allocations)  
36 are implemented through management prescriptions that provide specific  
37 standards and guidelines for forest resource management (USFS 1995).

1                   **Management Guide for the Shasta and Trinity Units of the Whiskeytown-**  
2                   **Shasta-Trinity National Recreation Area**

3                   The *Management Guide: Shasta and Trinity Units of the Whiskeytown-Shasta-*  
4                   *Trinity NRA* (USFS 1996) contains management strategies intended to achieve  
5                   or maintain desired conditions for the NRA. The document supplements the  
6                   STNF LRMP by providing specific information about current conditions in the  
7                   NRA, desired future conditions for the NRA, and management  
8                   recommendations for the NRA. STNF is responsible for administering the  
9                   Shasta and Trinity units of the NRA.

10                   **U.S. Bureau of Land Management Resource Management Plans**

11                   BLM manages a number of public lands adjacent to the Sacramento River  
12                   corridor downstream from Shasta Dam. The study area falls under two BLM  
13                   districts (Northern California and Central California) and the resource  
14                   management plans of three BLM field offices: Redding, Ukiah, and Mother  
15                   Lode (BLM 2006). The purpose of BLM’s resource management plans is to  
16                   provide overall direction for managing and allocating public resources in each  
17                   planning area.

18                   BLM’s Redding RMP (BLM 1993) provides guidance for the management of  
19                   cultural resources, fire, grazing, minerals, vegetation, water quality, wildlife and  
20                   fish habitats, and other resources and issues in Shasta County. The RMP  
21                   governs land use on BLM lands, including lands in the Sacramento River  
22                   Management Area. Planning issues addressed in the RMP include land tenure  
23                   adjustments, such as land acquisition, exchange, and sale; recreation  
24                   management; access; and forest management, including harvesting, herbicide  
25                   use, and special-status species.

26                   The RMP was amended by the 1994 Record of Decision for the *Northwest*  
27                   *Forest Plan* (Final Supplemental EIS for Amendments to Forest Service and  
28                   Bureau of Land Management Planning Documents within the Range of the  
29                   Northern Spotted Owl). This amendment required preparation of a Watershed  
30                   Analysis prior to initiating BLM activities. As a party to the *Northwest Forest*  
31                   *Plan*, BLM, like USFS, is also required to ensure that projects are consistent  
32                   with the Aquatic Conservation Strategy.

33                   **Federal Wild and Scenic Rivers Act**

34                   The Federal WSRA, enacted in 1968, established the National Wild and Scenic  
35                   Rivers System “to preserve rivers with outstanding natural, cultural, and  
36                   recreational values in a free-flowing condition for the enjoyment of present and  
37                   future generations.” To be eligible for inclusion in the system, a river must be  
38                   free-flowing and exhibit outstandingly remarkable values. Free-flowing means  
39                   “existing or flowing in a natural condition without impoundment, diversion,  
40                   straightening, rip-rapping, or other modification of the waterway” (16 USC  
41                   Section 1286). Outstandingly remarkable values are scenic, recreational,  
42                   geologic, fish and wildlife, historic, cultural, or other similar values (16 USC  
43                   Section 1271). Depending on the specific attributes of a river, it may be



1 designated as “wild,” “scenic,” or “recreation.” Different segments of a single  
2 river can receive different designations; in other words, some segments can be  
3 designated wild, some scenic, and some recreation or combinations of these  
4 designations. Recreation rivers are defined as “rivers or sections of rivers that  
5 are readily accessible by road or railroad, that may have some development  
6 along their shorelines, and that may have undergone some impoundment or  
7 diversion in the past” (16 USC Section 1286).

8 State-designated rivers may be added to the Federal system upon the request of  
9 the state’s governor and the approval of the Secretary of the Interior (16 USC  
10 Section 1286). Two sections of the American River were added to the federal  
11 system in 1981 under this method. These sections are the lower American River  
12 from Nimbus Dam to the river’s confluence with the Sacramento River and the  
13 North Fork American River from its source to the Iowa Hill Bridge. The North  
14 Fork section is located above Nimbus, Folsom, and Lake Clementine dams  
15 many miles upstream from the confluence with Sacramento River. The North  
16 Fork is not regulated by Folsom Dam and would not be affected by hydraulic  
17 changes in the Sacramento River. The lower American River is designated as a  
18 recreational river.

## 19 **17.2.2 State**

### 20 ***California Public Resources Code, Division 6***

21 PRC Division 6 grants the State Lands Commission (SLC) jurisdiction over 4.5  
22 million acres of land held in trust for Californians. SLC’s jurisdiction includes a  
23 3-mile-wide section of tidal and submerged land adjacent to the coast and  
24 offshore islands, including bays, estuaries, and lagoons. It also includes the  
25 waters and beds of more than 120 rivers, lakes, streams, and sloughs. The State  
26 holds these lands for the public trust purposes of water-related commerce,  
27 navigation, fisheries, recreation, and open space. SLC may grant dredging  
28 permits and issue land use leases for activities within its jurisdiction. SLC does  
29 not have a comprehensive use plan for these lands but manages them according  
30 to State and Federal laws and regulations. In the primary study area, SLC’s  
31 jurisdiction includes areas along the Sacramento River north of Red Bluff.

### 32 ***California Fire Plan***

33 The *California Fire Plan* was prepared by the State Board of Forestry and the  
34 California Department of Forestry and Fire Protection to provide a  
35 comprehensive strategy for wildland fire protection and prevention in  
36 California. The plan provides recommendations for fire-safe land use planning.  
37 Preventive measures include using fire-resistant building materials, maintaining  
38 a defensible space around structures, vegetation management, and infrastructure  
39 planning.

### 40 ***Water Quality Control Plan***

41 The *Water Quality Control Plan for the Sacramento River and San Joaquin*  
42 *River Basins* provides water quality objectives to protect beneficial uses of

1 designated rivers and streams. *Water Quality Control Plan for the Sacramento*  
2 *River and San Joaquin River Basins* objectives are incorporated into county and  
3 city general plans, zoning ordinances, and subdivision ordinances.

4 ***California Public Resources Code, Sections 5093.50–5093.70***

5 PRC Sections 5093.50–5093.70 were established through 1972 enactment of the  
6 State Wild and Scenic Rivers Act, which was subsequently amended on several  
7 occasions, to preserve certain rivers that possess extraordinary scenic,  
8 recreational, fishery, or wildlife values in their free-flowing state. The PRC  
9 identifies, classifies, and provides protection for specific rivers or river  
10 segments, as approved by the Legislature. Rivers or river segments that are  
11 specifically identified and classified in the PRC compose the State Wild and  
12 Scenic Rivers System. As described in PRC Section 5093.50, rivers or river  
13 segments included in the State system must possess “extraordinary scenic,  
14 recreational, fishery, or wildlife values”; however, the PRC does not define  
15 what constitutes “extraordinary.”

16 Depending on the specific conditions of a river, it may be designated as “wild,”  
17 “scenic,” or “recreation.” Different segments of a single river can receive  
18 different designations; in other words, some segments can be designated wild,  
19 some scenic, and some recreation or combinations of these designations.  
20 Recreation river segments are readily accessible by road or railroad, may have  
21 some development along their shorelines, and may have been impounded or  
22 diverted in the past (PRC Section 5093.53).

23 With its initial passage, the State system protected segments of eight rivers,  
24 including two sections of the American River. These sections include the lower  
25 American from Nimbus Dam to its confluence with the Sacramento River and  
26 the North Fork from its source to the Iowa Hill Bridge. The North Fork section  
27 is located above Nimbus, Folsom, and Lake Clementine dams many miles  
28 upstream from the confluence with Sacramento River. The North Fork is not  
29 regulated by Folsom Dam and would not be affected by hydraulic changes in  
30 the Sacramento River. The lower American is designated as a recreational river.

31 **17.2.3 Regional and Local**

32 ***Shasta County General Plan***

33 The *Shasta County General Plan* (2004) guides land use planning on non-  
34 Federal land for Shasta County through 2025. The Community Organization  
35 and Development Pattern element of the *Shasta County General Plan*  
36 establishes policies related to the organization and relationships of the  
37 community types present in Shasta County, the living environments these  
38 communities offer, and the locations of development in relation to these  
39 communities. These policies were developed to maintain and enhance the  
40 quality of their environments. The Community Organization and Development  
41 Pattern element includes several objectives that influence land use decisions in  
42 the project study area:

- 1                   • To promote a development pattern that will accommodate, consistent  
2 with the other objectives of the plan, the growth that will be  
3 experienced by Shasta County
  
- 4                   • To guide development in a pattern that will provide opportunities for  
5 present and future county residents to enjoy the variety of living  
6 environments that currently exist within the county
  
- 7                   • To guide development in a pattern that will respect the natural resource  
8 values of county lands and their contributions to the county’s economic  
9 base
  
- 10                  • To guide development in a pattern that will minimize land use conflicts  
11 between adjacent land users
  
- 12                  • To recognize that the major economic resources for achieving the  
13 development pattern will come from the private sector, rather than  
14 government, and that the general plan, as the expression of community  
15 values, will guide the use of these resources

16                   ***Tehama County General Plan***

17                   The *Tehama County General Plan Update 2009–2029* is used to guide future  
18 development in unincorporated areas of the county. The Land Use element of  
19 the General Plan Update establishes the goals, policies, and implementation  
20 measures that will help guide the growth and development of Tehama County  
21 for the next 20 years. This element also contains the General Plan Land Use  
22 Map, which delineates those areas of the county where future residential  
23 development of varying densities and nonresidential growth is anticipated or  
24 will be directed (Tehama County 2009).

25                   ***City of Shasta Lake General Plan***

26                   The planning boundaries for the *City of Shasta Lake General Plan* are within  
27 the Shasta Lake and vicinity study area, north of Keswick Dam, east of the  
28 Sacramento River, and west of I-5. This general plan was adopted in 1999 and  
29 is intended to guide land use planning within the city through the Year 2020  
30 (City of Shasta Lake 1999). The following statement from the Land Use  
31 element of the general plan identifies some of the concerns surrounding land use  
32 decisions within the City of Shasta Lake:

33                   *The Land Use Element and the Land Use and Circulation Map*  
34 *constitute the physical framework for the general plan, which*  
35 *designates the proposed location, distribution, and extent of*  
36 *land uses. Land use was a specific area of concern identified as*  
37 *being key to the development of the City of Shasta Lake. Some*  
38 *of the major issues identified included an evaluation and*  
39 *establishment of urban, rural, and urban reserve boundaries.*  
40 *This was accomplished by identifying areas that currently lack*

1                                    *infrastructure that would be required to develop in an orderly*  
2                                    *manner through the development of Area Plans.*

3                                    **City of Redding General Plan**

4                                    The planning boundaries for the *City of Redding General Plan* encompass areas  
5                                    within the city limits and the urban growth boundary. This plan was adopted in  
6                                    2000 and is intended to guide land use planning through the year 2020 (City of  
7                                    Redding 2000). The Community Development and Design element of the  
8                                    general plan states the following about the role and effects of land use policies:

9                                    *Land use policies and the General Plan Diagram affect every*  
10                                    *property in the City. They determine how people can*  
11                                    *use/develop their land and what they can reasonably expect to*  
12                                    *develop next door, down the street, or across town. They*  
13                                    *provide for overall consistency and compatibility between land*  
14                                    *uses and can be a determining factor in quality of life. The*  
15                                    *policies ... also have a direct bearing on traffic, the feasibility*  
16                                    *of public transportation, and the quality of the air.*

17                                    **City of Anderson General Plan**

18                                    The planning boundaries of the *City of Anderson General Plan* encompass areas  
19                                    within the city limits and the urban growth boundary. The City of Anderson  
20                                    released its updated general plan in May 2007 (City of Anderson 2007). The  
21                                    general plan is intended to guide land use planning within the city through the  
22                                    Year 2027. The following statement from the Land Use element of the general  
23                                    plan identifies some of the concerns surrounding land use decisions within the  
24                                    City of Anderson:

25                                    *The Land Use Element describes the pattern of land*  
26                                    *development within the City of Anderson and the proposed*  
27                                    *expansion area and provides direction for the future*  
28                                    *development envisioned for the City. Also included in this*  
29                                    *Element are descriptions of geographic areas that are*  
30                                    *anticipated to be developed over the term of this General Plan*  
31                                    *and goals and policies to guide the City's decision makers in*  
32                                    *their review of development proposals. This Element also*  
33                                    *defines land use categories and provides supporting detail for*  
34                                    *the uses depicted upon the Anderson General Plan Land Use*  
35                                    *Diagram.*

36                                    **Red Bluff General Plan**

37                                    The planning boundaries for the *City of Red Bluff General Plan* encompass  
38                                    areas within the city limits and the urban growth boundary. The adopted  
39                                    General Plan elements are as follows: Circulation element (1991), Housing  
40                                    element (2004), and Land Use, Natural Environment, Noise, and Safety  
41                                    elements (1993). The following statement from the Land Use element

1 summarizes concerns relative to land use decisions in Red Bluff (City of Red  
2 Bluff 1993):

3 *The land use element identifies the spatial arrangement of*  
4 *existing and proposed uses of land including public lands and*  
5 *facilities. It lays out the distribution of classes of land use, the*  
6 *intensity of those uses, and proposes a strategy of goals,*  
7 *objectives, policies and implementation measures to promote a*  
8 *wise use of land to promote the welfare of the community.*

## 9 **17.3 Environmental Consequences and Mitigation Measures**

### 10 **17.3.1 Methods and Assumptions**

11 To characterize existing land uses in the primary study area, pertinent planning  
12 documents were reviewed to identify objectives for the level, type, location,  
13 density, and intensity of development and to determine whether the alternatives  
14 would be in conflict with current plans and policies. Planning documents that  
15 were reviewed include the STNF LRMP (USFS 1995), the Management Guide  
16 for the NRA, and the general plans for the cities of Shasta Lake, Redding,  
17 Anderson, and Red Bluff and Shasta and Tehama counties. Land use maps and  
18 zoning maps were consulted to identify planned land uses. The analysis also  
19 included a review of aerial photography to determine existing land uses in the  
20 primary study area.

21 The impacts of each alternative are analyzed separately, starting with the  
22 analysis of the No-Action Alternative, followed by each of the action  
23 alternatives. The impact analysis includes a discussion of both direct and  
24 indirect impacts associated with each alternative.

### 25 **17.3.2 Criteria for Determining Significance of Effects**

26 An environmental document prepared to comply with NEPA must consider the  
27 context and intensity of the environmental effects that would be caused by, or  
28 result from, the proposed action. Under NEPA, the significance of an effect is  
29 used solely to determine whether an EIS must be prepared. An environmental  
30 document prepared to comply with CEQA must identify the potentially  
31 significant environmental effects of a proposed project. A “[s]ignificant effect  
32 on the environment” means a substantial, or potentially substantial, adverse  
33 change in any of the physical conditions within the area affected by the project”  
34 (State CEQA Guidelines, Section 15382). CEQA also requires that the  
35 environmental document propose feasible measures to avoid or substantially  
36 reduce significant environmental effects (State CEQA Guidelines, Section  
37 15126.4(a)).

38 The following significance criteria were developed based on guidance provided  
39 by the State CEQA Guidelines and consider the context and intensity of the  
40 environmental effects as required under NEPA. Impacts of an alternative related

1 to land use and planning would be significant if project implementation would  
2 do any of the following:

- 3 • Create land uses that are incompatible with existing and planned land  
4 uses adjacent to actions described as part of the project
- 5 • Introduce substantial nuisance effects on sensitive land uses that would  
6 disrupt use over an extended time period
- 7 • Conflict with any applicable land use plan, policy, ordinance, or  
8 regulation of an agency with jurisdiction over the project (including  
9 general plans, specific plans, and zoning ordinances) adopted for the  
10 purpose of avoiding or mitigating an environmental effect
- 11 • Disrupt or divide the physical arrangement of an established  
12 community
- 13 • Conflict with any applicable habitat conservation or natural community  
14 conservation plan

### 15 **17.3.3 Topics Eliminated from Further Consideration**

16 Effects of the proposed enlargement of Shasta Lake on the listed segments of  
17 the American River have been eliminated from further consideration in this  
18 DEIS. The listed segment of the North Fork American River has been  
19 eliminated because it is above any regulated reaches and is many miles from the  
20 confluence of the American and Sacramento rivers. The lower American River  
21 has been eliminated because none of the alternatives would adversely affect its  
22 designation as a recreational river under the Federal WSRA or the PRC. Under  
23 each of the action alternatives, releases from Shasta Dam would increase from  
24 late spring through early autumn. Increased releases from Shasta Dam during  
25 this period would reduce the volume of water released from Folsom Dam during  
26 the primary recreation season on the lower American River (late spring through  
27 early autumn). Flow volumes and water levels within the lower American River  
28 would, however, remain substantially similar to existing conditions and would  
29 remain within the river's typical range of variation during the primary  
30 recreation season. During the secondary recreation season (autumn through  
31 spring), precipitation is greater, flows in the Sacramento River and Delta are  
32 higher, and releases from Shasta Dam would be reduced to increase storage in  
33 Shasta Lake. Reclamation may need to occasionally increase releases from  
34 Folsom Dam to accommodate demand and offset decreased releases from  
35 Shasta Dam. Flow volumes and water levels in the lower American River  
36 would, however, remain substantially similar to existing conditions and within  
37 the river's typical range of variation during the secondary recreation season.

1 **17.3.4 Direct and Indirect Effects**

2 ***No-Action Alternative***

3 **Shasta Lake and Vicinity, Upper Sacramento River (Shasta Dam to Red**  
4 **Bluff), Lower Sacramento River and Delta, and CVP/SWP Service Areas**

5 The impact discussion for the No-Action Alternative addresses all of both the  
6 primary and extended study areas together, because this alternative would not  
7 affect land use in either the primary or extended study area.

8 *Impact LU-1 (No-Action): Disruption of Existing Land Uses* No new facilities  
9 would be constructed and no existing facilities would be altered, expanded, or  
10 demolished. Therefore, no impact would occur. Mitigation is not required for  
11 the No-Action Alternative.

12 *Impact LU-2 (No-Action): Conflict with Existing Land Use Goals and Policies*  
13 *of Affected Jurisdictions* No new facilities would be constructed and no  
14 existing facilities would be altered, expanded, or demolished. Therefore, no  
15 impact would occur. Mitigation is not required for the No-Action Alternative.

16 ***CP1 – 6.5-Foot Dam Raise, Anadromous Fish Survival and Water Supply***  
17 ***Reliability***

18 **Shasta Lake and Vicinity and Upper Sacramento River (Shasta Dam to**  
19 **Red Bluff)** The impact discussion for CP1 addresses the Shasta Lake and  
20 vicinity and upper Sacramento River portions of the primary study area  
21 together, because impacts from construction activities would affect both areas.

22 *Impact LU-1 (CP1): Disruption of Existing Land Uses* Project construction  
23 activities associated with enlarging Shasta Dam and relocating utilities,  
24 infrastructure, and public service and recreational facilities could result in short-  
25 term and long-term disruptions to land uses by interfering with the ability to use  
26 certain lands and interfering with access to certain lands. Construction activities  
27 that could disrupt land uses include the transport of project materials to and  
28 from project construction sites and the demolition and relocation of some  
29 utilities. This impact would be potentially significant.

30 It is anticipated that construction activities would be limited to the Shasta Lake  
31 and vicinity portion of the primary study area; therefore, no impacts associated  
32 with disruption of existing land uses would be expected to occur downstream  
33 from Shasta Dam.

34 Construction activities specific to enlarging Shasta Dam would be limited to the  
35 existing footprint of the Shasta Dam facilities and areas immediately adjacent.  
36 The project construction site would be accessed by existing roadways (I-5,  
37 Shasta Dam Boulevard, and Lake Boulevard). The access roads allow  
38 commercial truck use and are capable of supporting project-generated traffic.  
39 Road modifications would be necessary to accommodate project traffic en route  
40 to the construction sites and access restrictions would occur. Noise, air quality,

1 and traffic impacts along these local roadways are evaluated in separate sections  
2 of the DEIS. Equipment staging areas would be sited to avoid affecting or  
3 conflicting with existing land uses.

4 Project construction activities associated with relocating utilities, infrastructure,  
5 and public service and recreational facilities could result in temporary and  
6 localized disruptions of existing land uses. Lake inundation resulting from  
7 future dam operations could result in long-term disruptions of land uses in the  
8 primary study area. The Utilities and Miscellaneous Minor Infrastructure  
9 Technical Memorandum provides descriptions and detailed maps of the utilities  
10 and infrastructure (e.g., roads, bridges, campgrounds, boat ramps) that would  
11 be demolished or relocated in the ancillary areas near Shasta Lake (Reclamation  
12 2007). Chapter 18, "Recreation and Public Access," evaluates the project's  
13 impacts on recreational use, including short-term disruption of recreational use  
14 and or change in the type and location of recreational use. Chapter 21, "Utilities  
15 and Service Systems," of this DEIS evaluates the project's impacts on utilities  
16 and service systems, and the environmental impacts of utilities demolition and  
17 relocation are evaluated in the pertinent technical chapters of the DEIS (e.g.,  
18 Water Quality, Air Quality and Climate, and Noise and Vibration).

19 Construction activities would affect major features around Shasta Lake and  
20 vicinity and would require demolition, relocation, modification, or  
21 reconstruction to prevent inundation of the features caused by an increased  
22 reservoir elevation. The major features affected would include:

- 23 • Major roads and road segments (Lakeshore Drive realignment)
- 24 • Vehicle bridges (Charlie Creek, Doney Creek, McCloud River,  
25 Didallas Creek, and Second Creek)
- 26 • Railroad bridge
- 27 • Utilities and service systems infrastructure
- 28 • Campgrounds and picnic areas
- 29 • Boat ramps and associated parking areas
- 30 • Buildings (resort/marina, residential, USFS facilities)

31 The communities of Lakeshore and Sugarloaf would be affected the most by  
32 transportation infrastructure relocation activities. Seventy-five small road  
33 segments (both paved and unpaved) would need to be modified. CP1 would  
34 result in the inundation of Lakeshore Drive at numerous locations south of  
35 Charlie Creek Bridge and in two locations between the Charlie Creek and  
36 Doney Creek bridges. Relocation of Lakeshore Drive and the UPRR would  
37 occur near existing residences and businesses. Road construction activity could



1 result in temporary and localized increases in dust, noise, and construction truck  
2 traffic and potential disruption of access.

3 Seven bridges would need to be replaced. Construction activities associated  
4 with bridge modifications and relocations, particularly in areas with existing  
5 development such as Bridge Bay Marina and the communities of Lakeshore and  
6 Sugarloaf, could result in short-term disruptions of nearby residential,  
7 commercial, and industrial land uses. Bridge construction activity could result  
8 in temporary and localized increases in dust, noise, and construction truck  
9 traffic and potential disruption of access.

10 Approximately 64,000 feet of power and telecommunications lines would need  
11 to be demolished and reconstructed in areas around Shasta Lake. Utilities  
12 infrastructure relocation activities could result in short-term disruptions of land  
13 uses in communities and recreation areas around Shasta Lake. Relocation  
14 activities could require partial or full road closures and other access restrictions  
15 to ensure public safety. Utilities relocation activities could also result in  
16 temporary and localized increases in dust, noise, heavy equipment traffic, and  
17 other project traffic.

18 An estimated 56 buildings would be affected under a 6.5-foot dam raise. The  
19 buildings have been categorized as residential (cottages, homes, etc.),  
20 commercial (resorts, marinas, stores, etc.), and USFS sites (work stations,  
21 campground buildings, recreation site restrooms, etc.). Buildings within the  
22 inundation area would be removed, and some would be relocated. Utilities  
23 associated with the removed buildings (water systems, septic systems,  
24 telecommunications and power facilities) would also require demolition or  
25 abandonment. Construction activity related to removal and/or relocation of  
26 buildings would result in temporary and localized increases in dust, noise, and  
27 construction truck traffic and potential disruption of access. Some existing  
28 marinas would need to be modified or relocated, which would disrupt existing  
29 commercial and recreational land uses. See the *Recreation and Public Access*  
30 *Technical Report* for details concerning marina relocations.

31 Reservoir dikes would be required in the areas of Antlers/Lakeshore and  
32 railroad embankments would be required at the UPRR track at the south end of  
33 Bridge Bay for protection of existing infrastructure from increased full pool  
34 elevations. Additional sites for dike and embankment construction could be  
35 added in the future. Dike and embankment construction could serve to lessen  
36 long-term land use impacts resulting from the project by eliminating the need to  
37 remove and relocate a number of structures. Construction activities associated  
38 with dike and embankment construction would result in temporary and localized  
39 increases in dust, noise, and construction truck traffic and potential disruption of  
40 access.

41 Project implementation could result in short-term disruptions of land uses of  
42 parcels around Shasta Lake and vicinity during construction and relocation

1 activities; long-term disruptions of land use could also result from project  
2 operations. This impact would be potentially significant. Mitigation for this  
3 impact is proposed in Section 17.3.5.

4 *Impact LU-2 (CP1): Conflict with Existing Land Use Goals and Policies of*  
5 *Affected Jurisdictions* Project implementation would result in inundating land  
6 around Shasta Lake, which could conflict with land use goals and policies of  
7 affected jurisdictions. Relocation of utilities and service systems resulting from  
8 project implementation could also conflict with existing land use goals and  
9 policies. This impact would be potentially significant.

10 It is anticipated that construction activities would be limited to the Shasta Lake  
11 and vicinity portion of the primary study area; therefore, no conflicts with  
12 existing land use goals and policies would be expected to occur in planning  
13 jurisdictions downstream from Shasta Dam.

14 Project implementation would result in an increase in reservoir pool elevation  
15 during extreme storm events, which could result in the flooding of  
16 approximately 1,110 acres in the lower elevations around Shasta Lake. To  
17 prevent utilities and infrastructure damage, Reclamation would relocate roads,  
18 utilities and service systems, marinas, and other structures and would modify a  
19 number of bridges. Relocation plans are based on broad assumptions regarding  
20 optimum construction, operation, and environmental conditions. Areas planned  
21 for relocation activities could have land use designations that conflict with the  
22 land use proposed by the project. It is anticipated that some relocation activities  
23 would conflict with land use designations. Specific relocation sites are needed  
24 before a detailed analysis can be made. Once relocation sites are known, the  
25 proposed land use would be compared to the existing land uses and land use  
26 designations to determine consistency with the STNF LRMP, the Shasta County  
27 General Plan, and the Shasta County Zoning Ordinance as applicable.

28 Areas that would be most affected by project implementation are located on the  
29 Sacramento Arm of Shasta Lake and include the communities of Sugarloaf and  
30 Lakeshore. A number of existing residential land uses would be inundated by a  
31 higher full pool elevation in Shasta Lake. Residences within 20 feet of the new  
32 full pool elevation would be demolished and most would be relocated.

33 Most recreation facilities that could be inundated by project implementation  
34 would be relocated; some recreation facilities would be relocated adjacent to  
35 existing recreation facilities. Sites proposed for the relocation of recreational  
36 facilities could be inconsistent with the current land use designations.  
37 Reclamation would cooperate with USFS to find the most suitable relocation  
38 sites that would be consistent with the STNF LRMP and the NRA Management  
39 Guide.

40 The proposed use of Turntable Bay as a developed recreation area would  
41 require an amendment to the USFS STNF LRMP (USFS 1995) to change the

1 land management prescription from Roded Recreation (Prescription III) to  
2 Roded, High Density Recreation (Prescription IV). Under the USFS Planning  
3 Regulations, this would be considered a nonsignificant amendment to the STNF  
4 LRMP.

5 Open space lands would be inundated. STNF LRMP land allocations that would  
6 be inundated include Riparian Reserve allocations. Loss of the use of NRA  
7 lands would be inconsistent with STNF LRMP and NRA goals and policies.  
8 Reclamation would coordinate mitigation measures with USFS to minimize the  
9 impacts from losing the ability to use lands around Shasta Lake.

10 Vegetation clearing required for the relocation of structures, marinas, recreation  
11 facilities, and utilities could be inconsistent with the STNF LRMP, the *Shasta*  
12 *County General Plan*, and the Shasta County Zoning Ordinance. Many  
13 relocation activities would require vegetation clearing prior to construction.  
14 Specific clearing sites would be dependent on the sites chosen for utilities,  
15 building, and infrastructure relocation. The sites have not been determined at  
16 this time. Once specific relocation sites are known and the areas requiring  
17 vegetation clearance are determined, an analysis would be performed to  
18 determine whether the proposed action would be inconsistent with the STNF  
19 LRMP, the NRA Management Guide, the *Shasta County General Plan*, and the  
20 Shasta County Zoning Ordinance. Reclamation would obtain authorization  
21 and/or use permits, or other suitable instrument, from USFS for actions within  
22 the jurisdiction of USFS; Reclamation would also obtain authorization and/or  
23 use permits from Shasta County and the California Department of Forestry and  
24 Fire Protection for vegetation clearing activities within the jurisdiction of Shasta  
25 County.

26 It should be noted that even where site-specific land use designations in the  
27 NRA conflict with proposed relocation activities, the STNF LRMP identifies 46  
28 resource specific goals for the STNF. One of the key goals is “provide for  
29 continued use and new development of hydroelectric facilities.” This implies  
30 that specific USFS land allocations that may be inconsistent with relocation  
31 activities could be revised or amended for project purposes. However,  
32 Reclamation would cooperate with USFS to amend site-specific land use  
33 designations, which could require additional NEPA review.

34 Site-specific information is needed for all infrastructure, building, and utilities  
35 relocation plans to review completely for consistency with existing land use  
36 planning documents, primarily the STNF LRMP and the *Shasta County General*  
37 *Plan*. Given the magnitude of facilities that might be relocated, including  
38 existing marinas, it is anticipated that there would be some inconsistencies with  
39 existing planning policies. This impact would be potentially significant.  
40 Mitigation for this impact is proposed in Section 17.3.5.

1                   **Lower Sacramento River and Delta and CVP/SWP Service Areas**

2                   *Impact LU-3 (CP1): Disruption of Existing Land Uses* Construction activities  
3 would be limited to the primary study area; therefore, there would be no  
4 disruption of existing land uses in the extended study area. No impact would  
5 occur. Mitigation for this impact is not needed, and thus not proposed.

6                   *Impact LU-4 (CP1): Conflict with Existing Land Use Goals and Policies of*  
7 *Affected Jurisdictions* Construction activities would be limited to the primary  
8 study area; therefore, no conflicts with existing land use goals and policies  
9 would occur in the extended study area. No impact would occur. Mitigation for  
10 this impact is not needed, and thus not proposed.

11                   **CP2 – 12.5-Foot Dam Raise, Anadromous Fish Survival and Water Supply**  
12                   **Reliability**

13                   **Shasta Lake and Vicinity and Upper Sacramento River (Shasta Dam to**  
14 **Red Bluff)** The impact discussion for CP2 addresses the Shasta Lake and  
15 vicinity and upper Sacramento River portions of the primary study area  
16 together, because impacts from construction activities would affect both areas.

17                   *Impact LU-1 (CP2): Disruption of Existing Land Uses* Project construction  
18 activities associated with enlarging Shasta Dam and relocating utilities,  
19 infrastructure, and public service and recreational facilities could result in short-  
20 term and long-term disruptions to land uses by interfering with the ability to use  
21 certain lands and interfering with access to certain lands. Construction activities  
22 that could disrupt land uses include the transport of project materials to and  
23 from project construction sites. Limitation on site use associated with  
24 construction at a particular site or facility would also occur. This impact would  
25 be potentially significant.

26                   This impact would be similar to Impact LU-1 (CP1). A dam raise of 12.5 feet  
27 would result in a larger area of inundation than under CP1, which would, in  
28 turn, result in additional relocation of existing structures, infrastructure, and  
29 utilities and a longer duration for the impact. Reclamation estimates the  
30 construction of CP2 would take 5 years, which would be 6 months longer than  
31 for CP1. CP2 would, therefore, result in longer term disruptions of land use than  
32 would CP1. Approximately 500 additional acres would be inundated by CP2,  
33 totaling 1,750 acres of land that would be inundated by Shasta Dam operations.  
34 Specific information regarding the location and number of structures that would  
35 be permanently lost will be incorporated into the land use impact analysis.

36                   Project implementation could result in short-term and long-term disruptions of  
37 existing land uses. Therefore, this impact would be potentially significant.  
38 Mitigation for this impact is proposed in Section 17.3.5.

39                   *Impact LU-2 (CP2): Conflict with Existing Land Use Goals and Policies of*  
40 *Affected Jurisdictions* Project implementation could result in a permanent loss  
41 of inundated land around Shasta Lake, which could conflict with land use goals

1 and policies of affected jurisdictions. Relocation of utilities and service systems  
2 resulting from project implementation could also conflict with existing land use  
3 goals and policies. This impact would be potentially significant.

4 This impact would be similar to Impact LU-2 (CP1). A dam raise of 12.5 feet  
5 would create a larger area of inundation than under CP1, which, compared to  
6 CP1, would result in additional relocation of structures and infrastructure that  
7 would be subject to USFS and Shasta County land use goals and policies. A  
8 site-specific analysis would be conducted to determine where relocation  
9 activities and permanent land base losses resulting from project implementation  
10 would be inconsistent with the STNF LRMP, the NRA Management Guide, the  
11 *Shasta County General Plan*, and the Shasta County Zoning Ordinance.

12 Project implementation could result in short-term and long-term impacts that  
13 could conflict with existing land use goals and policies. Therefore, this impact  
14 would be potentially significant. Mitigation for this impact is proposed in  
15 Section 17.3.5.

16 **Lower Sacramento River and Delta and CVP/SWP Service Areas**

17 *Impact LU-3 (CP2): Disruption of Existing Land Uses* Construction activities  
18 would be limited to the primary study area; therefore, there would be no  
19 disruption of existing land uses in the extended study area. No impact would  
20 occur. Mitigation for this impact is not needed, and thus not proposed.

21 *Impact LU-4 (CP2): Conflict with Existing Land Use Goals and Policies of*  
22 *Affected Jurisdictions* Construction activities would be limited to the primary  
23 study area; therefore, no conflicts with existing land use goals and policies  
24 would occur in the extended study area. No impact would occur. Mitigation for  
25 this impact is not needed, and thus not proposed.

26 **CP3 – 18.5-Foot Dam Raise, Agricultural Water Supply Reliability and**  
27 **Anadromous Fish Survival**

28 **Shasta Lake and Vicinity and Upper Sacramento River (Shasta Dam to**  
29 **Red Bluff)** The impact discussion for CP3 addresses the Shasta Lake and  
30 vicinity and upper Sacramento River portions of the primary study area  
31 together, because impacts from construction activities would affect both areas.

32 *Impact LU-1 (CP3): Disruption of Existing Land Uses* Project construction  
33 activities associated with enlarging Shasta Dam and relocating utilities,  
34 infrastructure, and public service and recreational facilities could result in short-  
35 term and long-term disruptions to land uses by interfering with the ability to use  
36 certain lands and interfering with access to certain lands. Construction activities  
37 that could disrupt land uses include the transport of project materials to and  
38 from project construction sites. Limitation on site use associated with  
39 construction at a particular site or facility would also occur. This impact would  
40 be potentially significant.

1 This impact would be similar to Impact LU-1 (CP1). A dam raise of 18.5 feet  
2 would result in a larger area of inundation than under CP1, which would result  
3 in additional relocation of existing structures and infrastructure compared to  
4 CP1 and a longer duration for the impact. Reclamation estimates that  
5 construction of CP3 would take 60 months, which would be 6 months longer  
6 than for CP1. Approximately 2,500 acres of land would be inundated by CP3  
7 and, according to the 2003 infrastructure inventory at Shasta Lake, an estimated  
8 160 buildings would be inundated under an 18.5-foot dam raise (Shasta County  
9 2003). Specific information regarding the location and number of structures that  
10 would be permanently lost would be incorporated into the land use impact  
11 analysis. CP3 would require a more extensive (longer and wider) system of  
12 reservoir dikes than CP1 to accommodate increased Shasta Lake elevations  
13 resulting from Shasta Dam operations. A dam raise of 18.5 feet would result in  
14 the encroachment of 100 road segments. Lakeshore Drive could be inundated  
15 for nearly its entire length between Charlie Creek and Doney Creek.

16 Project implementation could result in short- and long-term disruptions of  
17 existing land uses. Therefore, this impact would be potentially significant.  
18 Mitigation for this impact is proposed in Section 17.3.5.

19 *Impact LU-2 (CP3): Conflict with Existing Land Use Goals and Policies of*  
20 *Affected Jurisdictions* Project implementation could result in a permanent loss  
21 of inundated land around Shasta Lake, which could conflict with land use goals  
22 and policies of affected jurisdictions. Relocation of utilities and service systems  
23 resulting from project implementation could also conflict with existing land use  
24 goals and policies. This impact would be potentially significant.

25 This impact would be similar to Impact LU-2 (CP1). A dam raise of 18.5 feet  
26 would result in a larger area of inundation than CP1, which, compared to CP1,  
27 would result in additional relocation of existing structures and infrastructure that  
28 would be subject to existing USFS and Shasta County land use goals and  
29 policies. A site-specific analysis would be conducted to determine where  
30 relocation activities and permanent land base losses resulting from project  
31 implementation would be inconsistent with the STNF LRMP, the NRA  
32 Management Guide, the *Shasta County General Plan*, and the Shasta County  
33 Zoning Ordinance.

34 Project implementation could result in short-term and long-term impacts that  
35 could conflict with existing land use goals and policies. Therefore, this impact  
36 would be potentially significant. Mitigation for this impact is proposed in  
37 Section 17.3.5.

38 **Lower Sacramento River and Delta and CVP/SWP Service Areas**  
39 *Impact LU-3 (CP3): Disruption of Existing Land Uses* Construction activities  
40 would be limited to the primary study area; therefore, there would be no  
41 disruption of existing land uses in the extended study area. No impact would  
42 occur. Mitigation for this impact is not needed, and thus not proposed.

1 *Impact LU-4 (CP3): Conflict with Existing Land Use Goals and Policies of*  
2 *Affected Jurisdictions* Construction activities would be limited to the primary  
3 study area; therefore, no conflicts with existing land use goals and policies  
4 would occur in the extended study area. No impact would occur. Mitigation for  
5 this impact is not needed, and thus not proposed.

6 **CP4 – 18.5-Foot Dam Raise, Anadromous Fish Focus with Water Supply**  
7 **Reliability**

8 **Shasta Lake and Vicinity and Upper Sacramento River (Shasta Dam to**  
9 **Red Bluff)** The impact discussion for CP4 addresses the Shasta Lake and  
10 vicinity and upper Sacramento River portions of the primary study area  
11 together, because impacts from construction activities would affect both areas.

12 *Impact LU-1 (CP4): Disruption of Existing Land Uses* Project construction  
13 activities associated with enlarging Shasta Dam and relocating utilities,  
14 infrastructure, and public service and recreational facilities could result in short-  
15 term and long-term disruptions to land uses by interfering with the ability to use  
16 certain lands and interfering with access to certain lands. Gravel augmentation  
17 and the habitat restoration activities along the upper Sacramento River could  
18 also cause minor disruptions of existing land uses in the primary study area.  
19 Construction activities that could disrupt land uses include the transport of  
20 project materials and equipment to and from project construction sites.  
21 Limitation on site use associated with construction at a particular site or facility  
22 would also occur. This impact would be potentially significant.

23 This impact would be similar to Impact LU-1 (CP1). Therefore, this impact  
24 would be potentially significant. Mitigation for this impact is proposed in  
25 Section 17.3.5.

26 *Impact LU-2 (CP4): Conflict with Existing Land Use Goals and Policies of*  
27 *Affected Jurisdictions* Project implementation could result in a permanent loss  
28 of inundated land around Shasta Lake, which could conflict with land use goals  
29 and policies of affected jurisdictions. Relocation of utilities and service systems  
30 resulting from project implementation could also conflict with existing land use  
31 goals and policies, resulting in a significant impact. Gravel augmentation and  
32 the habitat restoration activities along the upper Sacramento River would not  
33 alter land uses and would not be expected to conflict with existing land use  
34 goals and policies. This impact would be potentially significant.

35 This impact would be similar to Impact LU-2 (CP1). Therefore, this impact  
36 would be potentially significant. Mitigation for this impact is proposed in  
37 Section 17.3.5.

38 **Lower Sacramento River and Delta and CVP/SWP Service Areas**

39 *Impact LU-3 (CP4): Disruption of Existing Land Uses* Construction activities  
40 would be limited to the primary study area; therefore, there would be no

1 disruption of existing land uses in the extended study area. No impact would  
2 occur. Mitigation for this impact is not needed, and thus not proposed.

3 *Impact LU-4 (CP4): Conflict with Existing Land Use Goals and Policies of*  
4 *Affected Jurisdictions* Construction activities would be limited to the primary  
5 study area; therefore, no conflicts with existing land use goals and policies  
6 would occur in the extended study area. No impact would occur. Mitigation for  
7 this impact is not needed, and thus not proposed.

8 **CP5 – 18.5-Foot Dam Raise, Combination Plan**

9 **Shasta Lake and Vicinity and Upper Sacramento River (Shasta Dam to**  
10 **Red Bluff)** The impact discussion for CP5 addresses the Shasta Lake and  
11 vicinity and upper Sacramento River portions of the primary study area  
12 together, because impacts from construction activities would affect both areas.

13 *Impact LU-1 (CP5): Disruption of Existing Land Uses* Project construction  
14 activities associated with enlarging Shasta Dam and relocating utilities,  
15 infrastructure, and public service and recreational facilities could result in short-  
16 term and long-term disruptions to land uses by interfering with the ability to use  
17 certain lands and interfering with access to certain lands. Gravel augmentation  
18 and the habitat restoration activities along the upper Sacramento River could  
19 also cause minor disruptions of existing land uses in the primary study area.  
20 Construction activities that could disrupt land uses include the transport of  
21 project materials and equipment to and from project construction sites.  
22 Limitation on site use associated with construction at a particular site or facility  
23 would also occur. This impact would be potentially significant.

24 This impact would be similar to Impact LU-1 (CP1). Therefore, this impact  
25 would be potentially significant. Mitigation for this impact is proposed in  
26 Section 17.3.5.

27 *Impact LU-2 (CP5): Conflict with Existing Land Use Goals and Policies of*  
28 *Affected Jurisdictions* Project implementation could result in a permanent loss  
29 of inundated land around Shasta Lake, which could conflict with land use goals  
30 and policies of affected jurisdictions. Relocation of utilities and service systems  
31 resulting from project implementation could also conflict with existing land use  
32 goals and policies, resulting in a significant impact. Gravel augmentation and  
33 the habitat restoration activities along the upper Sacramento River would not  
34 alter land uses and would not be expected to conflict with existing land use  
35 goals and policies. This impact would be potentially significant.

36 This impact would be similar to Impact LU-2 (CP-1). Therefore, this impact  
37 would be potentially significant. Mitigation for this impact is proposed in  
38 Section 17.3.5.



**Lower Sacramento River and Delta and CVP/SWP Service Areas**

*Impact LU-3 (CP5): Disruption of Existing Land Uses* Construction activities would be limited to the primary study area; therefore, there would be no disruption of existing land uses in the extended study area. No impact would occur. Mitigation for this impact is not needed, and thus not proposed.

*Impact LU-4 (CP5): Conflict with Existing Land Use Goals and Policies of Affected Jurisdictions* Construction activities would be limited to the primary study area; therefore, no conflicts with existing land use goals and policies would occur in the extended study area. No impact would occur. Mitigation for this impact is not needed, and thus not proposed.

**17.3.5 Mitigation Measures**

Table 17-1 presents a summary of mitigation measures for land use.

**Table 17-1. Summary of Mitigation Measures for Land Use**

Impact		No-Action Alternative	CP1	CP2	CP3	CP4	CP5
Impact LU-1: Disruption of Existing Land Uses (Shasta Lake and Vicinity and Upper Sacramento River)	LOS before Mitigation	NI	PS	PS	PS	PS	PS
	Mitigation Measure	None required.	LU-1: Minimize and/or Avoid Temporary Disruptions to Local Communities.				
	LOS after Mitigation	NI	SU	SU	SU	SU	SU
Impact LU-2: Conflict with Existing Land Use Goals and Policies of Affected Jurisdictions (Shasta Lake and Vicinity and Upper Sacramento River)	LOS before Mitigation	NI	PS	PS	PS	PS	PS
	Mitigation Measure	None required.	LU-2: Minimize and/or Avoid Conflicts with Land Use Goals and Policies.				
	LOS after Mitigation	NI	SU	SU	SU	SU	SU
Impact LU-3: Disruption of Existing Land Uses (Lower Sacramento River, Delta, CVP/SWP Service Areas)	LOS before Mitigation	NI	NI	NI	NI	NI	NI
	Mitigation Measure	None required.	None needed; thus, none proposed.				
	LOS after Mitigation	NI	NI	NI	NI	NI	NI
Impact LU-4: Conflict with Existing Land Use Goals and Policies of Affected Jurisdictions (Lower Sacramento River, Delta, CVP/SWP Service Areas)	LOS before Mitigation	NI	NI	NI	NI	NI	NI
	Mitigation Measure	None required.	None needed; thus, none proposed.				
	LOS after Mitigation	NI	NI	NI	NI	NI	NI

Key:  
LOS = level of significance  
LTS = less than significant  
NI = no impact  
PS = potentially significant  
SU = significant and unavoidable

1                    **No-Action Alternative**

2                    No mitigation measures are required for this alternative.

3                    **CP1 – 6.5-Foot Dam Raise, Anadromous Fish Survival and Water Supply**  
4                    **Reliability**

5                    No mitigation is required for Impacts LU-3 (CP1) and LU-4 (CP1). Mitigation  
6                    is provided below for the impacts of CP1 on land uses in the primary study area.

7                    **Mitigation Measure LU-1 (CP1): Minimize and/or Avoid Temporary**  
8                    **Disruptions to Local Communities** To minimize and/or avoid temporary  
9                    disruption to local communities, the following measures will be implemented  
10                    during project construction:

- 11                    • Prior to construction, Reclamation and its contractor will develop a  
12                    construction plan for each affected community (i.e., Lakeshore,  
13                    Sugarloaf), consisting of the following:
  - 14                    – Alternate access routes will be identified for local residences and  
15                    businesses affected by project construction activities.
  - 16                    – Construction and staging areas will be fenced, secured, and clearly  
17                    marked. Security will be provided to ensure public safety.
  - 18                    – Public parking areas outside of the construction staging areas will  
19                    be kept clear of construction-related equipment of materials at all  
20                    times.
  - 21                    – Any open trenches will be covered or secured after daily activities  
22                    to protect worker and public safety.
  - 23                    – Construction activities near noise-sensitive land uses (e.g., near  
24                    residences, campgrounds) or land uses that experience high levels  
25                    of public activity (e.g., boat ramps, marinas) will be restricted to  
26                    days and hours that minimize land use conflicts to the extent  
27                    feasible.
- 28                    • The contractor will provide advance notice of the construction activities  
29                    schedule to the affected community members (e.g., residences, property  
30                    owners, business owners, and public facilities operators), including  
31                    posting of signs in the project area.
- 32                    • The contractor will provide a phone number and community contact for  
33                    inquiries about the project throughout the construction period.
- 34                    • Reclamation and its contractor will coordinate with local jurisdictions  
35                    and obtain all necessary permits (e.g., encroachment permit, utility  
36                    excavation permit), will comply with permit conditions established to

1 minimize construction impacts, and will assign an inspector to the  
2 project to oversee construction activities.

3 Implementation of this mitigation measure would substantially reduce land use  
4 capability impacts generated by short-term construction activities, but might not  
5 reduce all impacts to a less-than-significant level. As a result, Impact LU-1  
6 (CP1) would be significant and unavoidable.

7 **Mitigation Measure LU-2 (CP1): Minimize and/or Avoid Conflicts with**  
8 **Land Use Goals and Policies** To reduce conflicts with land use goals and  
9 policies of affected jurisdictions, Reclamation will implement the following  
10 measures:

- 11 • Reclamation will coordinate with USFS to find the most suitable  
12 relocation sites for recreation facilities with respect to consistency with  
13 the STNF LRMP and the NRA Management Guide.
- 14 • Reclamation will coordinate with USFS to identify measures to  
15 minimize the impacts of the loss of use of USFS lands around Shasta  
16 Lake (including open space and Riparian Reserve allocations) caused  
17 by inundation, and measures to offset inconsistencies with the STNF  
18 LRMP and NRA goals and policies related to the loss of use of NRA  
19 lands.
- 20 • As utility and facility relocation sites are being refined, Reclamation  
21 will evaluate consistency of the relocated land uses with the STNF  
22 LRMP, the NRA Management Guide, the Shasta County General Plan,  
23 and the county zoning ordinance. To the degree possible, Reclamation  
24 will design the relocated utilities and facilities to comply with these  
25 plans and ordinances. If needed, Reclamation will seek permits,  
26 easements, and or plan amendments.

27 Implementation of this mitigation measure would substantially reduce land use  
28 plan consistency impacts, but might not reduce all impacts to a less-than-  
29 significant level. As a result, Impact LU-2 (CP1) would be significant and  
30 unavoidable.

31 ***CP2 – 12.5-Foot Dam Raise, Anadromous Fish Survival and Water Supply***  
32 ***Reliability***

33 No mitigation is required for Impacts LU-3 (CP2) and LU-4 (CP2). Mitigation  
34 is provided below for the impacts of CP2 on land uses in the primary study area.

35 **Mitigation Measure LU-1 (CP2): Minimize and/or Avoid Temporary**  
36 **Disruptions to Local Communities** This mitigation measure is identical to  
37 Mitigation Measure LU-1 (CP1). Implementation of this mitigation measure  
38 would substantially reduce land use capability impacts generated by short-term  
39 construction activities, but might not reduce all impacts to a less-than-

1 significant level. As a result, Impact LU-1 (CP2) would be significant and  
2 unavoidable.

3 **Mitigation Measure LU-2 (CP2): Minimize and/or Avoid Conflicts with**  
4 **Land Use Goals and Policies** This mitigation measure is identical to  
5 Mitigation Measure LU-2 (CP1). Implementation of this mitigation measure  
6 would substantially reduce land use plan consistency impacts, but might not  
7 reduce all impacts to a less-than-significant level. As a result, Impact LU-2  
8 (CP2) would be significant and unavoidable.

9 **CP3 – 18.5-Foot Dam Raise, Anadromous Fish Survival and Water Supply**  
10 No mitigation is required for Impacts LU-3 (CP3) and LU-4 (CP3). Mitigation  
11 is provided below for the impacts of CP3 on land uses in the primary study area.

12 **Mitigation Measure LU-1 (CP3): Minimize and/or Avoid Temporary**  
13 **Disruptions to Local Communities** This mitigation measure is identical to  
14 Mitigation Measure LU-1 (CP1). Implementation of this mitigation measure  
15 would substantially reduce land use capability impacts generated by short-term  
16 construction activities, but might not reduce all impacts to a less-than-  
17 significant level. As a result, Impact LU-1 (CP3) would be significant and  
18 unavoidable.

19 **Mitigation Measure LU-2 (CP3): Minimize and/or Avoid Conflicts with**  
20 **Land Use Goals and Policies** This mitigation measure is identical to  
21 Mitigation Measure LU-2 (CP1). Implementation of this mitigation measure  
22 would substantially reduce land use plan consistency impacts, but might not  
23 reduce all impacts to a less-than-significant level. As a result, Impact LU-2  
24 (CP3) would be significant and unavoidable.

25 **CP4 – 18.5-Foot Dam Raise, Anadromous Fish Focus with Water Supply**  
26 **Reliability**

27 No mitigation is required for impacts LU-3 and LU-4 in the extended study  
28 area. Mitigation is provided below for the impacts of CP4 on land uses in the  
29 primary study area.

30 **Mitigation Measure LU-1 (CP4): Minimize and/or Avoid Temporary**  
31 **Disruptions to Local Communities** This mitigation measure is identical to  
32 Mitigation Measure LU-1 (CP1). Implementation of this mitigation measure  
33 would substantially reduce land use capability impacts generated by short-term  
34 construction activities, but might not reduce all impacts to a less-than-  
35 significant level. As a result, Impact LU-1 (CP4) would be significant and  
36 unavoidable.

37 **Mitigation Measure LU-2 (CP4): Minimize and/or Avoid Conflicts with**  
38 **Land Use Goals and Policies** This mitigation measure is identical to  
39 Mitigation Measure LU-2 (CP1). Implementation of this mitigation measure  
40 would substantially reduce land use plan consistency impacts, but might not

1 reduce all impacts to a less-than-significant level. As a result, Impact LU-2  
2 (CP4) would be significant and unavoidable.

3 **CP5 – 18.5-Foot Dam Raise, Combination Plan**

4 No mitigation is required for impacts LU-3 and LU-4 for the extended study  
5 area. Mitigation is provided below for the impacts of CP5 on land uses in the  
6 primary study area.

7 **Mitigation Measure LU-1 (CP5): Minimize and/or Avoid Temporary**  
8 **Disruptions to Local Communities** This mitigation measure is identical to  
9 Mitigation Measure LU-1 (CP1). Implementation of this mitigation measure  
10 would substantially reduce land use capability impacts generated by short-term  
11 construction activities, but might not reduce all impacts to a less-than-  
12 significant level. As a result, Impact LU-1 (CP5) would be significant and  
13 unavoidable.

14 **Mitigation Measure LU-2 (CP5): Minimize and/or Avoid Conflicts with**  
15 **Land Use Goals and Policies** This mitigation measure is identical to  
16 Mitigation Measure LU-2 (CP1). Implementation of this mitigation measure  
17 would substantially reduce land use plan consistency impacts, but might not  
18 reduce all impacts to a less-than-significant level. As a result, Impact LU-2  
19 (CP5) would be significant and unavoidable.

20 **17.3.6 Cumulative Effects**

21 The action alternatives could temporarily affect land use in the Shasta Lake and  
22 vicinity portion of the primary study area during construction, and some  
23 components might be inconsistent with the STNF LRMP, the NRA  
24 Management Guide, the *Shasta County General Plan*, and the county zoning  
25 ordinance. Only two of the present or reasonably foreseeable future actions are  
26 located in the immediate vicinity of Shasta Lake and have the potential to  
27 conflict with land uses that might also be affected by construction of the action  
28 alternatives. These actions are the Antlers Bridge replacement and the Iron  
29 Mountain Mine Restoration Plan. The Antlers Bridge replacement is currently  
30 under construction and is expected to be completed in 2015, which is before any  
31 of the action alternatives would begin. With respect to the Iron Mountain Mine  
32 Restoration Plan, it is unlikely that this activity would occur simultaneously  
33 with the action alternatives, or would considerably and adversely affect use of  
34 the same land. Therefore, construction activities related to implementation of  
35 the proposed SLWRI alternatives would not contribute considerably to  
36 significant cumulative impacts related to temporary land use impacts. The  
37 cumulative effects of the action alternatives and the two present or reasonably  
38 foreseeable future actions on resources managed consistent with the STNF  
39 LRMP, the NRA Management Guide, the *Shasta County General Plan*, and the  
40 county zoning ordinance are addressed in the other pertinent technical chapters  
41 of the DEIS.

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