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.

Prehistoric Context

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

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

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

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

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

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

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

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

Ethnohistorical Context

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

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

Historical Context

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

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

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

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

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

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

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

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

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

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

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

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

14.1.2 Archaeological Resources and Historical Structures

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

Shasta Lake and Vicinity

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

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

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

- Forty-two major residential sites
- Thirty-seven residential sites
- Fifty-five artifact scatters
- Seventy-seven scatters of flaked stone tools and manufacturing debris
- Two caves
- Two sites of unknown character

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

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

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

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

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

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

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

Upper Sacramento River (Keswick Dam to Red Bluff)

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

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

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

- Thirteen major residential sites
- Twenty-two residential sites
- Seven rock shelters
- Five artifact scatters.
- Five flaked stone tool and manufacturing debris scatters
- Four rock art (petroglyph) sites
- Three sites of unknown character

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

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

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

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

14.1.3 Native American Resources

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

Traditional Cultural Properties

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

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

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

Sacred Sites

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

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

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

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

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

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

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

14.2 Regulatory Framework

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

14.2.1 Federal

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

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

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

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

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

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

14.2.2 State

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

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

14.2.3 Regulatory Compliance

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

Under Section 106, these efforts would include the following:

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

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

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

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

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

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

14.3 Environmental Consequences and Mitigation Measures

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

The environmental setting for this chapter includes only the primary study area, Shasta Lake and vicinity, and the upper Sacramento River between Keswick and the Red Bluff Pumping Plant, as explained in Section 14.1. No potential impacts are expected in the extended study area; therefore, only impacts to cultural resources in the primary study area will be discussed. The extended 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

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

Also included in the analysis was an assessment of the effects of inundation and drawdown on cultural resources located within the pool of a reservoir. Previous reservoir studies have shown that the greatest impacts occur 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–particularly if it includes areas that are above the current high-water line and thus have not previously been subject to inundation.

Archaeological and Historic-Era Structural Resources

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

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

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

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

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

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

Traditional Cultural Properties

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

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

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

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

Table 14-1. Native American Groups Involved in Consultations

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

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

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

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

14.3.2 Criteria for Determining Significance of Effects

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

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

Federal Criteria

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

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

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

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

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

State Criteria

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

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

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

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

- Substantial adverse change in the significance of an historical resource
- Substantial adverse change in the significance of a unique archaeological resource
- Disturbance or destruction of unique paleontological resource or site or unique geologic feature
- Disturbance of any human remains, including those interred outside of formal cemeteries
- Elimination of important examples of the major periods of California history or prehistory

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

14.3.3 Direct and Indirect Effects

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

No-Action Alternative

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

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

Shasta Lake and Vicinity

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

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

Upper Sacramento River (Shasta Dam to Red Bluff)

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

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

Cultural resources potentially impacted by this alternative include those within: (1) the proposed additional 1,229-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.). It should be noted that sites typically extend into the inundation and reservoir area for more than one alternative.

Shasta Lake and Vicinity

Impact Culture-1 (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

Inundation Area	
Prehistoric sites	212±54
Historic-era archival localities	355
Fluctuation Zone	
Prehistoric sites	675±172
Historic-era archival localities	529
0.25-Mile Buffer	
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

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

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

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

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

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

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

Although it is impossible at this stage to say how many of these resources will be adversely impacted due to inundation as a result of implementing CP1, this impact would be significant. Mitigation for this impact is not available. Mitigation for this impact is not proposed in Section 14.3.1 because no feasible 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

Inundation Area	
Prehistoric sites	224±57
Historic-era archival localities	371
Fluctuation Zone	
Prehistoric sites	675±172
Historic-era archival localities	529
0.25-Mile Buffer	
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

contain historic-era remains. Although the full extent and locations of project impacts related to construction activities within the buffer zone are not yet available for this alternative, they 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, and how many of the eligible resources will sustain adverse impacts from CP2, this impact would be significant. Inundation or other adverse impacts to affected resources likely cannot be mitigated because the importance of the identified properties and ceremonial locations is inextricably tied to physical location, and relocation of these features away from the inundation area is not possible. Adverse effects will be resolved through project redesign when warranted or through the development of an MOA or PA, as discussed in Section 14.3.1.

Impact Culture-2 (CP2): Inundation of Traditional Cultural Properties
Alternative CP2 is similar to Alternative CP1 with respect to its potential to cause or be affected by inundation. The NAHC identified sacred land filings within the study area. These locations are confidential, thus making it unclear whether or not they are situated within the CP2 area. For the same reasons that apply to CP1, this impact would be significant. Mitigation for this impact is not proposed in Section 14.3.1 because no feasible mitigation is available to reduce the impact to a less-than-significant level.

Upper Sacramento River (Shasta Dam to Red Bluff)
Impact Culture-3 (CP2): 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 CP2; therefore, no impacts on cultural resources related to construction are expected. Mitigation for this impact is not needed, and thus not proposed.

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

Cultural resources potentially impacted by this alternative include those within (1) the proposed additional 2,497-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 (CP3): 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 CP3 would include approximately 243±63 prehistoric resources

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

Table 14-4. Cultural Resources Impacts for CP3

Inundation Area	
Prehistoric sites	243±63
Historic-era archival localities	391
Fluctuation Zone	
Prehistoric sites	675±172
Historic-era archival localities	529
0.25-Mile Buffer	
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.

Sensitivity studies estimate that, with complete surveys, the fluctuation zone for CP3 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 CP3 would include approximately 728±212 prehistoric resources. The historic-era archival study documented 773 localities that may contain historic-era remains. Although the full extent and locations of project impacts related to construction activities within the buffer zone are not yet available for this alternative, they 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, and how many of the eligible resources will sustain adverse impacts from CP3, this impact would be significant. Inundation or other adverse impacts to affected resources likely cannot be mitigated because the importance of the identified properties and ceremonial locations is inextricably tied to physical location, and relocation of these features away from the inundation area is not possible. Adverse effects will be resolved through project redesign when warranted or through the development of an MOA or PA, as discussed in Section 14.3.1.

Impact Culture-2 (CP3): Inundation of Traditional Cultural Properties
Alternative CP3 is similar to Alternative CP1 with respect to its potential to cause or be affected by inundation. The NAHC identified sacred land filings within the study area. These locations are confidential, thus making it unclear whether or not they are situated within the CP3 area. For the same reasons that apply to CP1, this impact would be significant. Mitigation for this impact is not

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

Mitigation for this impact is not available.

Upper Sacramento River (Shasta Dam to Red Bluff)

Impact Culture-3 (CP3): 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 CP3; therefore, no impacts on cultural resources related to construction are expected. Mitigation for this impact is not needed, and thus not proposed.

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

Cultural resources potentially impacted by this alternative include those within (1) the proposed additional 2,497-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.). CP4 also includes downstream ecosystem enhancements with spawning gravel augmentation and floodplain and riparian habitat restoration, both of which would entail construction activities adjacent to the upper Sacramento River.

Shasta Lake and Vicinity

Impact Culture-1 (CP4): 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 CP4 would include approximately 243±63 prehistoric resources (Table 14-5). The historic-era archival study documented 391 localities that may potentially contain historic-era remains within this inundation area.

Table 14-5. Cultural Resources Impacts for CP4

Inundation Area	
Prehistoric sites	243±63
Historic-era archival localities	391
Fluctuation Zone	
Prehistoric sites	601±154
Historic-era archival localities	524
0.25-Mile Buffer	
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.

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

Sensitivity studies estimate that, with complete surveys, the 0.25-mile buffer zone for CP4 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 related to construction activities within the buffer zone are not yet available for this alternative, they 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, and how many of the eligible resources will sustain adverse impacts from CP4, this impact would be significant. Inundation or other adverse impacts to affected resources likely cannot be mitigated because the importance of the identified properties and ceremonial locations is inextricably tied to physical location, and relocation of these features away from the inundation area is not possible. Adverse effects will be resolved through project redesign when warranted or through the development of an MOA or PA, as discussed in Section 14.3.1.

Impact Culture-2 (CP4): Inundation of Traditional Cultural Properties
Alternative CP4 is similar to Alternative CP1 with respect to its potential to cause or be affected by inundation. The NAHC identified sacred land filings within the study area. These locations are confidential, thus making it unclear whether or not they are situated within the CP4 area. For the same reasons that apply to CP1, this impact would be significant. Mitigation for this impact is not proposed in Section 14.3.1 because no feasible mitigation is available to reduce the impact to a less-than-significant level.

Upper Sacramento River (Shasta Dam to Red Bluff)
Impact Culture-3 (CP4): Disturbance or Destruction of Archaeological and Historical Resources near the Upper Sacramento River Due to Construction
This impact would be significant. Previous cultural resource studies indicated the presence of cultural resources in or near proposed downstream construction areas related to spawning gravel augmentation and floodplain and riparian habitat restoration.

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

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

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

CP5 – 18.5-Foot Dam Raise, Combination Plan

Cultural resources potentially impacted by this alternative include those within (1) the proposed additional 2,497-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.). CP5 also includes downstream ecosystem enhancements with spawning gravel augmentation and floodplain and riparian habitat restoration, both of which would entail construction activities adjacent to the upper Sacramento River.

Shasta Lake and Vicinity

Impact Culture-1 (CP5): 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 CP5 would include approximately 243±63 prehistoric resources (Table 14-6). The historic-era archival study documented 391 localities that may potentially contain historic-era remains within this inundation area.

Table 14-6. Cultural Resources Impacts for CP5

Inundation Area	
Prehistoric sites	243±63
Historic-era archival localities	391
Fluctuation Zone	
Prehistoric sites	675±175
Historic-era archival localities	529
0.25-Mile Buffer	
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.

Sensitivity studies estimate that, with complete surveys, the fluctuation zone for CP5 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 CP5 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 related to construction activities within the buffer zone are not yet available for this alternative, they 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, and how many of the eligible resources will sustain adverse impacts from CP5, this impact would be significant. Inundation or other adverse impacts to affected resources likely cannot be mitigated because the importance of the identified properties and ceremonial locations is inextricably tied to physical location, and relocation of these features away from the inundation area is not possible. Adverse effects will be resolved through project redesign when warranted or through the development of an MOA or PA, as discussed in Section 14.3.1.

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

Upper Sacramento River (Shasta Dam to Red Bluff)

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

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

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

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

14.3.4 Mitigation Measures

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

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

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.

These impacts would be less than significant after mitigation.

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

CP5 – 18.5-Foot Dam Raise, Combination Plan

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 (CP5): 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.

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

14.3.5 Cumulative Effects

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

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Chapter 15
Indian Trust Assets

15.1 Affected Environment

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

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

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

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

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

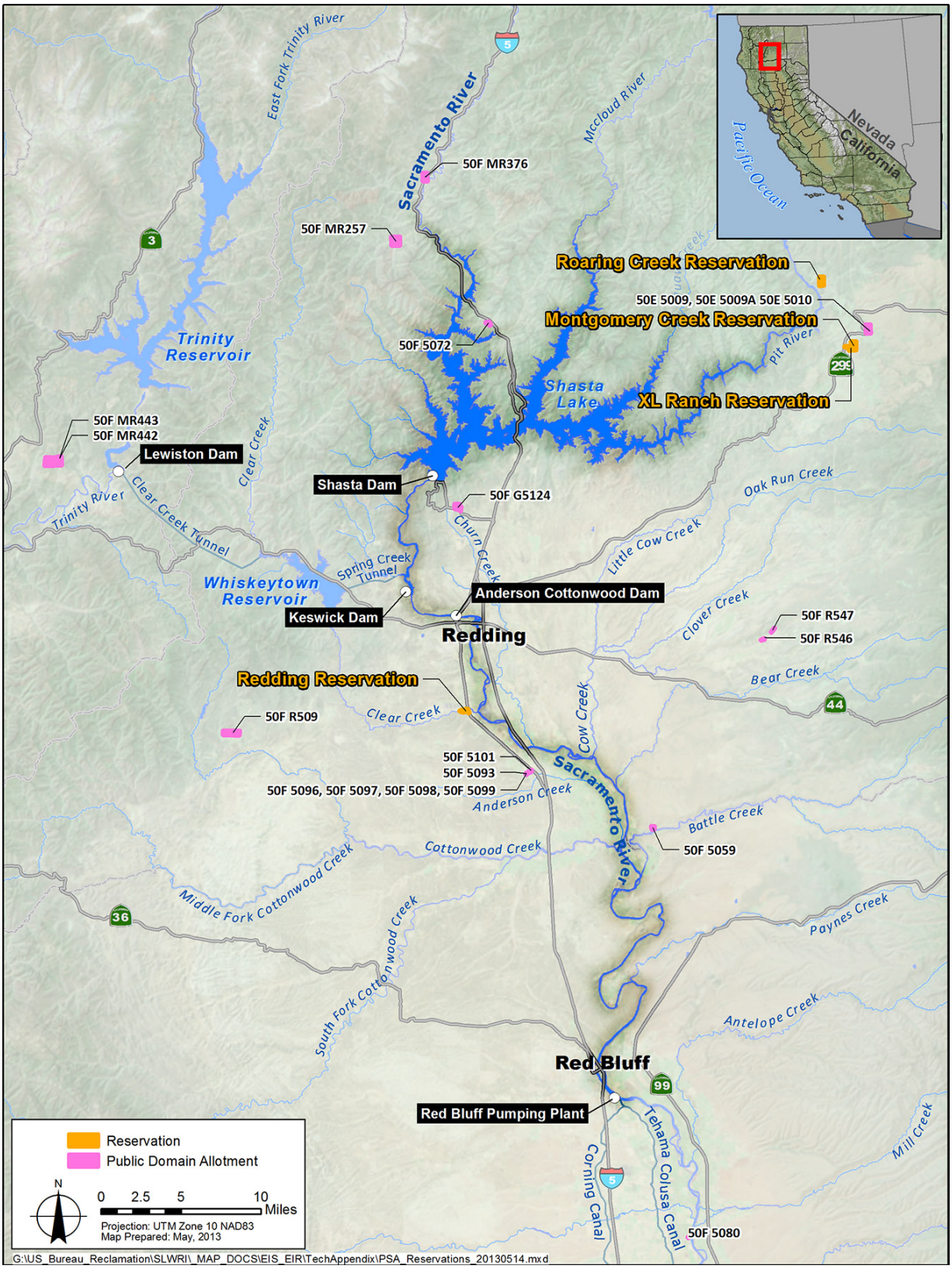

Figure 15-1. Reservations, Rancherias and Public Domain Allotments in Primary Study Area

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*

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

15.3 Environmental Consequences and Mitigation Measures

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

15.3.1 Methods and Assumptions

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

15.3.2 Direct and Indirect Effects

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

No-Action Alternative

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

CP1 Through CP5

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

Cumulative Impacts

There are no impacts to ITAs as a result of the proposed action; therefore, the 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

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

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

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

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

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

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

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

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

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

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

Lower Sacramento River and Delta

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

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

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

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

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

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

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

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

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

CVP/SWP Service Areas

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

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

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

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

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

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

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

16.1.2 Population

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

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

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

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

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

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

Lower Sacramento River and Delta

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

CVP/SWP Service Areas

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

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

16.1.3 Housing

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

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

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

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

Lower Sacramento River and Delta

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

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

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

CVP/SWP Service Areas

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

16.2 Regulatory Framework

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

16.2.1 Federal

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

National Environmental Policy Act

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

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

Council on Environmental Quality

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

Executive Order 12898 – Environmental Justice

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

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

16.2.2 State

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

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

16.2.3 Regional and Local

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

Shasta County

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

- **Housing Supply**
  - **Goal** – To establish and implement policies and programs that will:
    - Contribute to the provision of an adequate supply and diversity of safe, healthy, and affordable housing for all income levels to

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

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

- **Conserve and Improve Existing Affordable Housing**

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

- H**ousing Development Constraints**

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

- **Special Needs**

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

- **Energy Conservation**

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

- **Fair Housing**

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

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

- **ED-1** – Economic development plans, programs, and policies shall contribute to a stable and healthy economy in Shasta County, which includes provision of a land development pattern, planning process, and regulatory atmosphere conducive to maintaining employment opportunities for County residents and fostering new economic development.

- **ED-2** – Seek economic diversity that increases the variety, type and scale of business, industrial, and manufacturing activities.

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

Tehama County

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

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

- **Goal HE-3: Adequate Sites** – Ensure the provision of adequate sites and facilities to support future housing needs.

- **Goal HE-5: Housing Conservation** – Work to improve, maintain and conserve the County's existing housing stock.

- **Goal HE-6: Addressing Constraints** – Address and wherever possible remove, governmental constraints to the maintenance, improvement, or development of housing to meet the needs of County residents.

- **Goal HE-7: Fair Housing/Equal Opportunity** – Promote equal housing opportunities for all persons without discrimination regardless of age, race, sex, marital status, ethnic background, household composition, sources of income, or other arbitrary factors.

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

- **Goal ED-3** – Expand the economic base while maintaining a healthy and diverse local economy that meets the present and future employment, shopping, recreational, public safety, and service needs of Tehama County residents.

- **Goal ED-4** – Work toward providing adequate infrastructure to support commercial, industrial, and recreational development within Tehama County including clean-up of contaminated industrial sites.

- **Goal ED-7:** Protect and enhance environmentally sensitive lands and natural resources while, at the same time, promoting business expansion, retention, and recruitment.

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

16.3 Environmental Consequences and Mitigation Measures

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

16.3.1 Methods and Assumptions

Population, Housing, and Demographics

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

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

Employment and Labor Force

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

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

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

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

- IMPLAN modeling was completed for CP1 (which involves raising Shasta Dam by 6.5 feet); CP2 (which involves raising the dam by 12.5 feet); and CP3, CP4, and CP5 (all of which involve raising the dam by 18.5 feet).

- A construction period of approximately 4.5 years was assumed under CP1, and 5 years under CP2, CP3, CP4, and CP5.

- The "local economic study area" was defined as the four-county area of Shasta, Siskiyou, Tehama, and Trinity counties.

- A total labor force of 300 construction workers would be needed for CP1 and CP2, 350 construction workers would be needed for CP3 and CP4, and 360 construction workers would be needed for CP5.

- All 300–360 construction workers would be drawn directly from the local economic study area (used in IMPLAN modeling). (High unemployment in the primary study area and the availability of necessary worker skill sets supports this assumption.)

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

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

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

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

Business and Industry

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

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

Government and Finance

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

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

16.3.2 Criteria for Determining Significance of Effects

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

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

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

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

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

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

16.3.3 Topics Eliminated from Further Discussion

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

16.3.4 Direct and Indirect Effects

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

No-Action Alternative

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

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

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

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

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

Lower Sacramento River and Delta Under the No-Action Alternative, the projected population, demographics, and housing conditions as well as development conditions, described in Section 16.1, "Affected Environment," would remain unchanged. No impact on population, demographics, or housing would occur.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Impact Socio-2 (CP1): Short-Term Increases in Direct, Indirect, and Induced Employment in the Primary Study Area Related to Construction Activities
Construction activities associated with CP1 would generate approximately 300 construction jobs, 390 indirect jobs in various construction-related support industries, and 600 induced jobs because of increased household spending in the primary study area. Individuals to fill these jobs are expected to be drawn from the local community. These new jobs are expected to provide important but temporary employment opportunities to many unemployed construction workers in the primary study area. This impact would be beneficial.

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

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

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

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

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

Impact Socio-3 (CP1): 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 With the creation of 300 construction jobs resulting from CP1, the potential would exist for workers from other industries to move to jobs related to construction at Shasta Dam. Because of the size of the construction industry in the primary study area, and the high unemployment rate in the area, this impact would be less than significant.

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

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

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

Based on the results of modeling that was performed using Reclamation's IMPLAN model, an estimated $80.8 million would be directly paid each year to the approximately 300 construction workers required to complete work for CP1during the proposed 4.5-year construction period. The positions expected from implementation of project construction are anticipated to be union positions, and workers would be paid according to union wage and benefit standards.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Lower Sacramento River and Delta

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

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

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

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

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

Impact Socio-11 (CP1): 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 In addition to local tax revenues, CP1 is expected to increase short-term, construction-related State sales and income tax revenues received from businesses and residents of the lower Sacramento River and Delta portion of the extended study area. These additional revenues are expected to be cycled back to local government coffers through statewide programs and policies. This impact would be minor but beneficial.

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

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

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

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

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

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

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

CVP/SWP Service Areas

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

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

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

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

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

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

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

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

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

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

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

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

Impact Socio-17 (CP1): 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
Implementation of CP1 would substantially increase Shasta Dam's storage capacity. As stated in Impact Socio-16 (CP1), this additional storage capacity would improve the long-term availability and reliability of water in the CVP and SWP service areas. Beyond increasing agricultural production, this improved availability and reliability would reduce the long-term risk of urban water and power shortages, and their related adverse economic consequences. This impact would be beneficial.

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

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

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

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

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

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

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

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

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

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

Impact Socio-3 (CP2): 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 With the creation of 300 new construction jobs resulting from CP2, the potential would exist for workers from other industries to move to jobs related to construction at Shasta Dam. Because of the size of the construction industry in the primary study area and the high unemployment rate in the area, this impact would be less than significant.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Lower Sacramento River and Delta

Impact Socio-9 (CP2): Potential Temporary Increase in Indirect Employment in Construction-Related Businesses of the Lower Sacramento River and Delta Construction activities associated with CP2 would have the potential to result in a short-term increase in indirect employment within the lower Sacramento River and Delta portion of the extended study area. Depending on the location of construction material sourced outside of the primary study area, indirect increases in employment within construction-related businesses may result in the lower Sacramento River and Delta area. This impact would be beneficial.

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

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

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

Impact Socio-11 (CP2): 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 In addition to local tax revenues, CP2 would increase short-term construction-related State sales and income tax revenues received from businesses and residents of the lower Sacramento River and Delta portion of the extended study area. These additional revenues would be cycled back to local government coffers through statewide programs and policies. This impact would be minor but beneficial.

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

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

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

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

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

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

CVP/SWP Service Areas

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

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

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

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

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

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

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

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

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

Impact Socio-17 (CP2): 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 Implementation of CP2 would substantially increase Shasta Dam's storage capacity. As stated in Impact Socio-16 (CP2), this additional storage capacity would improve the long-term availability and reliability of water in the CVP and SWP service areas. Beyond increasing agricultural production, this improved availability and reliability would reduce the long-term risk of urban water and power shortages, and their related adverse economic consequences. This impact would be beneficial.

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

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

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

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

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

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

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

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

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

Impact Socio-2 (CP3): Short-Term Increases in Direct, Indirect, and Induced Employment in the Primary Study Area Related to Construction Activities Construction activities associated with CP3 are expected to generate approximately 350 direct construction jobs, 450 indirect jobs in various construction-related support industries, and 700 induced jobs because of increased household spending in the primary study area. Individuals to fill these jobs are expected to be drawn from the local community. These jobs are expected to provide important but temporary employment opportunities to many unemployed construction workers in the primary study area. This impact would be beneficial.

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

Impact Socio-3 (CP3): 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 With the creation of 350 construction jobs resulting from CP3, the potential would exist for workers from other industries to move to jobs related to construction at Shasta Dam. Because of the size of the construction industry in the primary study area and the high unemployment rate in the area, this impact would be less than significant.

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

Impact Socio-4 (CP3): Short-Term Increases in Direct, Indirect, and Induced Personal Income Paid to Employees in the Primary Study Area Hired for Construction-Related Activities Based on calculations completed as a part of Reclamation's IMPLAN socioeconomic model process, more than $93.6 million in personal income would be directly paid to employees in the primary study area each year of the 5-year construction period under CP3. In addition, more than $52.5 million in indirect and induced income is expected to be generated in various construction-related and other industries in the primary study area each year of construction under CP3. The combined $146.2 million in personal income to be generated would represent a 93.2 percent increase in

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Lower Sacramento River and Delta

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

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

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

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

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

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

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

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

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

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

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

CVP/SWP Service Areas

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

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

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

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

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

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

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

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

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

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

Impact Socio-17 (CP3): 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
Implementation of CP3 would substantially increase Shasta Dam's storage capacity. As stated in Impact Socio-16 (CP3), this additional storage capacity would improve long-term water availability and reliability in the CVP and SWP service areas. Beyond increasing agricultural production, this improved availability and reliability would reduce the long-term risk of urban water and power shortages, and their related adverse economic consequences. This impact would be beneficial.

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

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

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

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

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

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

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

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

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

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

Impact Socio-3 (CP4): 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 With the creation of 350 construction jobs resulting from CP4, the potential would exist for workers from other industries to move to jobs related to construction at Shasta Dam. Because of the size of the construction industry in the primary study area and the high unemployment rate in the area, this impact would be less than significant.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Lower Sacramento River and Delta

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

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

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

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

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

Impact Socio-11 (CP4): 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 In addition to local tax revenues, CP4 is expected to increase short-term, construction-related, State sales and income tax revenues received from businesses and residents of the lower Sacramento River and Delta portion of the extended study area. These additional revenues are expected to be cycled back to local government coffers through statewide programs and policies. This impact would be minor but beneficial.

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

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

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

CVP/SWP Service Areas

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

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

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

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

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

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

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

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

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

Impact Socio-17 (CP4): 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
Implementation of CP4 would substantially increase Shasta Dam's storage capacity. As stated in Impact Socio-16 (CP4), this additional storage capacity would improve long-term water availability and reliability in the CVP and SWP service areas. Beyond increasing agricultural production, this improved availability and reliability would reduce the long-term risk of urban water and power shortages, and their related adverse economic consequences. This impact would be beneficial.

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

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

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

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

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

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

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

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

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

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

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

Impact Socio-3 (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 With the creation of 360 construction jobs resulting from CP5, the potential would exist for workers from other industries to move to jobs related to construction at Shasta Dam. Because of the size of the construction industry in the primary study area and the high unemployment rate in the area, this impact would be less than significant.

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

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

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

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

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

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

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

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

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

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

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

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

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

Lower Sacramento River and Delta

Impact Socio-9 (CP5): Potential Temporary Increase in Indirect Employment in Construction-Related Businesses of the Lower Sacramento River and Delta Construction activities associated with CP5 would have the potential to result in a short-term increase in indirect employment within the lower Sacramento River and Delta portion of the extended study area. Depending on the location of construction materials sourced outside of the primary study area, indirect increases in employment within construction-related businesses may result in the lower Sacramento River and Delta area. This impact would be minor but beneficial.

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

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

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

Impact Socio-11 (CP5): 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 In addition to local tax revenues, CP5 is expected to increase short-term construction-related State sales and income tax revenues received from businesses and residents of the lower Sacramento River and Delta portion of the extended study area. These additional revenues are expected to be cycled back to local government coffers through statewide programs and policies. This impact would be minor but beneficial.

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

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

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

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

CVP/SWP Service Areas

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

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

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

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

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

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

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

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

Impact Socio-17 (CP5): 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 Implementation of CP5 would substantially increase Shasta Dam's storage capacity. As stated in Impact Socio-16 (CP5), this additional storage capacity would improve long-term water availability and reliability in the CVP and SWP service areas. Beyond increasing agricultural production, this improved availability and reliability would reduce the long-term risk of urban water and power shortages, and their related adverse economic consequences. This impact would be beneficial.

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

16.3.5 Mitigation Measures

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

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 Impact Socio-1 (CP1–CP5): Short-Term Increase in Population and Housing Demand in the Primary Study Area Resulting from Construction-Related Activities	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 (No-Action): Potential for Temporary Disruptions in Business and Industrial Activity in the Lower Sacramento River and Delta Area Impact Socio-2 (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-3 (No-Action): Potential for Reduced Employment Opportunities for Residents Within the CVP and SWP Service Areas Impact Socio-3 (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	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 (No-Action): Potential for Temporary Disruptions in Business and Industrial Activity in the CVP and SWP Service Areas 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.)

Impact		No-Action Alternative	CP1	CP2	CP3	CP4	CP5
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

No-Action Alternative

No mitigation measures are needed for this alternative.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

CP5 – 18.5-Foot Dam Raise, Combination Plan

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

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

16.3.6 Cumulative Effects

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

CP5 – 18.5-Foot Dam Raise, Combination Plan

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

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

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

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

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Chapter 17
Land Use and Planning

17.1 Affected Environment

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

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

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

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

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

17.1.1 Land Use

Shasta Lake and Vicinity

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

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

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

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

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

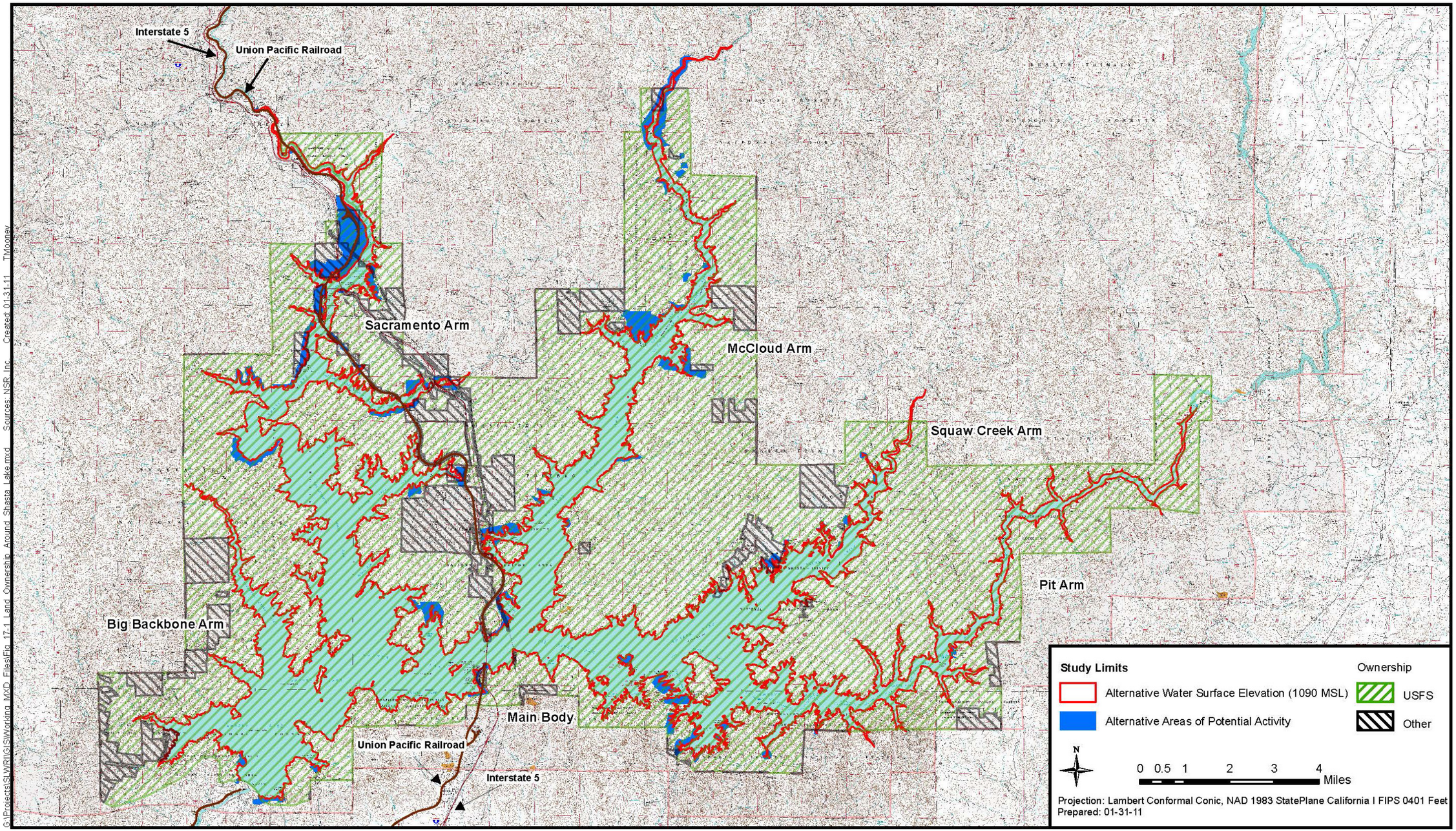

Figure 17-1. Land Ownership Around Shasta Lake

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

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

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

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

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

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

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

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

Upper Sacramento River (Shasta Dam to Red Bluff)

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

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

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

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

Lower Sacramento River and Delta

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

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

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

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

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

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

CVP/SWP Service Areas

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

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

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

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

17.1.2 Planning

Shasta Lake and Vicinity

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

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

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

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

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

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

- Lands
  - Plan for long-range land ownership adjustments that support resource objectives.
  - Provide for continued use and new development of hydroelectric facilities.

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

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

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

  - **Roaded, High Density Recreation** – Provide areas that are characterized by a substantially modified natural environment.

  - **Special Area Management** – Provide for protection and management of special interest areas and research natural areas.

  - **Heritage Resource Management** – The primary theme of this prescription is to protect designated cultural resource values, interpret significant archaeological and historical values for the public, and encourage scientific research of these selected properties.

- **Riparian Reserves** – Provide an area along streams, wetlands, ponds, lakes, and unstable and potentially unstable areas where riparian-dependent resources receive primary emphasis. The applicable management prescription is:

  - **Riparian Management** – Maintain or enhance riparian areas, wildlife and fisheries habitat, and water quality by emphasizing streamside and wetland management.

- **Matrix** – Includes Federal lands outside the categories of the designated areas listed above. There are no Matrix lands in the NRA. Matrix lands are where most timber harvest would occur and where standards and guidelines are in place to ensure appropriate conservation of ecosystems as well as provide habitat for rare and lesser known species. The applicable management prescriptions are:

  - **Roaded Recreation** – Provide for an area where there are moderate evidences of the sights and sounds of humans.

  - **Wildlife Habitat Management** – The primary purpose of this prescription is to maintain and enhance big game, small game, upland game bird, and nongame habitat to provide adequate hunting and viewing opportunities.

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

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

- Land exchanges will be pursued in accordance with the Forest Land Adjustment Guide. Lands directly adjacent to the shoreline will have the highest priority.

- Lands with significant known pollution sources arising from a history of mining discharge will not be acquired.

- Coordination will take place with Shasta County to allow those private land developments and resource production proposals that will maintain or enhance NRA values, and to disallow or phase out private land uses that detract from those values.

- Coordination will take place with county, State, and other Federal agencies on development, management, and regulatory oversight of recreation opportunities and facilities to ensure consistency with NRA objectives.

- Planning will take place with owners and managers of travel and utility corridors through the NRA (railroad, highway, and major power lines) to minimize the visual impacts of these corridors on the aesthetic value of the NRA.

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

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

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

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

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

- All lands identified for transfer to another agency or qualified organization are for long-term stewardship by the receiving entity.

- All land acquisitions will be through exchange, purchase, or donation. Acquisitions will be from willing sellers for available unimproved property. In all acquisitions, BLM will strive to gain the local support and understanding for the action.

- All land identified for disposal through exchange, Recreation and Public Purposes Act transfer, or sale meets the criteria set forth in the Federal Land Policy and Management Act of 1976.

- Land use authorizations (rights-of-way, leases, permits) will continue to be issued on a case-by-case basis and in accordance with decisions established in the RMP. Applications for land use authorizations which reduce the marketability of an exchange parcel will not be authorized.

- Rights-of-way will be issued to promote the maximum utilization of existing rights-of-way routes, including joint use whenever possible.

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

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

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

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

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

- **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

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

- Community park
- 100-year floodplain
- Public facilities
- Commercial
- Mixed use
- Rural residential (1 unit/2 acres, 1 unit/5 acres)
- Suburban residential (3 units/acre)
- Urban residential (10 units/acre)
- Urban residential – High (20 units/acre)

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

- Greenway
- Park, Park-Golf
- Public Facility; Public Facility-School
- Recreational
- General Office
- General Commercial
- Neighborhood Commercial
- Residential (2–3.5, 3.5–6, 6–10 units/acre)
- Critical Mineral Resource Overlay
- Mixed Use Neighborhood Overlay

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

- Commercial
- Industrial

- Public/Quasi-Public
- Medium-Density Residential
- Rural Residential/Rural Estate

City of Red Bluff The City of Red Bluff most recently amended its General Plan Land Use Element in 1993. The general plan designates the following land uses along the Sacramento River within the city limits and sphere of influence:

- Primary Floodplain
- Exclusive Agriculture
- General Commercial
- Central Business Districts
- Single-Family Residential
- General and Neighborhood Apartment Districts
- General Industrial
- Public Agency District
- Park

Lower Sacramento River and Delta

The lower Sacramento River and Delta are within the planning jurisdiction of Butte, Colusa, Contra Costa, Glenn, Sacramento, Solano, Sutter, Yolo, and Yuba counties. The largest cities in this region are Antioch, Chico, Davis, Fairfield, Martinez, Marysville, Pittsburg, Sacramento, Vacaville, Vallejo, West Sacramento, and Woodland. Each of these entities currently has adopted general plans and zoning ordinances. Land use planning documents are adopted by Federal agencies for federally managed lands in the lower Sacramento River and Delta areas.

CVP/SWP Service Areas

The CVP extends from the Cascade Range near Redding in the north to the Tehachapi Mountains near Bakersfield in the south. The CVP serves farms, homes, and industry in California's Central Valley as well as major urban centers in the San Francisco Bay Area. SWP contractors are in the southern San Joaquin Valley, Central Coastal area, and Southern California. The CVP and SWP service areas include portions of the primary and extended study areas. CVP water irrigates more than 3 million acres of farmland and provides drinking water to nearly 2 million consumers. SWP deliveries are 70 percent urban and 30 percent agriculture, serving 20 million Californians and more than 600,000 irrigated acres, respectively. Each of the counties and incorporated cities in the CVP and SWP service areas has adopted general plans and zoning

ordinances. Federally managed lands in the service areas are managed in accordance with land use and planning documents similar to the STNF LRMP and BLM's RMP, and military installations located in the service areas have their own planning processes.

17.2 Regulatory Framework

17.2.1 Federal

Federal land use policies apply only to actions on, or affecting the uses of, Federal lands. Federal lands in the primary study area consist of the following:

- National Forest lands managed by STNF around Shasta Lake
- Lands along the Sacramento River just south of Shasta Dam managed by Reclamation
- Lands managed by BLM along the Sacramento River south of Shasta Dam as far downstream as Red Bluff

Entry upon or use of these Federally administered lands would require approval from the appropriate Federal entity(ies).

Federal Land Policy and Management Act

The Federal Land Policy and Management Act was enacted to change the Federal public lands policy from disposal to retention. The act directs Federal agencies to apply land use principles that emphasize conservation; these include the principles of multiple use and sustained yield land management policies. The Federal Land Policy and Management Act consolidated and articulated BLM's management responsibilities and applies primarily to this Federal land management agency. Title V of the Federal Land Policy and Management Act also granted the Secretary of the Interior and the Secretary of Agriculture the authority to issue rights-of-way for various uses, including reservoirs.

Code of Federal Regulations

USFS personnel administer their responsibilities for regulating use and protecting National Forest lands under Title 36 of the CFR and sections of titles 16, 18, and 21. Public services directives from the code are integrated into the STNF LRMP and include the following topics: fire and fuels management, facilities management, law enforcement, and land management.

Shasta-Trinity National Forest Land and Resource Management Plan

The STNF LRMP is a forest-wide land use plan developed to guide resource management on STNF lands. Six broad categories are used to define management strategies. The management strategies (known as land allocations) are implemented through management prescriptions that provide specific standards and guidelines for forest resource management (USFS 1995).

Management Guide for the Shasta and Trinity Units of the Whiskeytown-Shasta-Trinity National Recreation Area

The *Management Guide: Shasta and Trinity Units of the Whiskeytown-Shasta-Trinity NRA* (USFS 1996) contains management strategies intended to achieve or maintain desired conditions for the NRA. The document supplements the STNF LRMP by providing specific information about current conditions in the NRA, desired future conditions for the NRA, and management recommendations for the NRA. STNF is responsible for administering the Shasta and Trinity units of the NRA.

U.S. Bureau of Land Management Resource Management Plans

BLM manages a number of public lands adjacent to the Sacramento River corridor downstream from Shasta Dam. The study area falls under two BLM districts (Northern California and Central California) and the resource management plans of three BLM field offices: Redding, Ukiah, and Mother Lode (BLM 2006). The purpose of BLM's resource management plans is to provide overall direction for managing and allocating public resources in each planning area.

BLM's Redding RMP (BLM 1993) provides guidance for the management of cultural resources, fire, grazing, minerals, vegetation, water quality, wildlife and fish habitats, and other resources and issues in Shasta County. The RMP governs land use on BLM lands, including lands in the Sacramento River Management Area. Planning issues addressed in the RMP include land tenure adjustments, such as land acquisition, exchange, and sale; recreation management; access; and forest management, including harvesting, herbicide use, and special-status species.

The RMP was amended by the 1994 Record of Decision for the *Northwest Forest Plan* (Final Supplemental EIS for Amendments to Forest Service and Bureau of Land Management Planning Documents within the Range of the Northern Spotted Owl). This amendment required preparation of a Watershed Analysis prior to initiating BLM activities. As a party to the *Northwest Forest Plan,* BLM, like USFS, is also required to ensure that projects are consistent with the Aquatic Conservation Strategy.

Federal Wild and Scenic Rivers Act

The Federal WSRA, enacted in 1968, established the National Wild and Scenic Rivers System "to preserve rivers with outstanding natural, cultural, and recreational values in a free-flowing condition for the enjoyment of present and future generations." To be eligible for inclusion in the system, a river must be free-flowing and exhibit outstandingly remarkable values. Free-flowing means "existing or flowing in a natural condition without impoundment, diversion, straightening, rip-rapping, or other modification of the waterway" (16 USC Section 1286). Outstandingly remarkable values are scenic, recreational, geologic, fish and wildlife, historic, cultural, or other similar values (16 USC Section 1271). Depending on the specific attributes of a river, it may be

designated as "wild," "scenic," or "recreation." Different segments of a single river can receive different designations; in other words, some segments can be designated wild, some scenic, and some recreation or combinations of these designations. Recreation rivers are defined as "rivers or sections of rivers that are readily accessible by road or railroad, that may have some development along their shorelines, and that may have undergone some impoundment or diversion in the past" (16 USC Section 1286).

State-designated rivers may be added to the Federal system upon the request of the state's governor and the approval of the Secretary of the Interior (16 USC Section 1286). Two sections of the American River were added to the federal system in 1981 under this method. These sections are the lower American River from Nimbus Dam to the river's confluence with the Sacramento River and the North Fork American River from its source to the Iowa Hill Bridge. The North Fork section is located above Nimbus, Folsom, and Lake Clementine dams many miles upstream from the confluence with Sacramento River. The North Fork is not regulated by Folsom Dam and would not be affected by hydraulic changes in the Sacramento River. The lower American River is designated as a recreational river.

17.2.2 State

California Public Resources Code, Division 6

PRC Division 6 grants the State Lands Commission (SLC) jurisdiction over 4.5 million acres of land held in trust for Californians. SLC's jurisdiction includes a 3-mile-wide section of tidal and submerged land adjacent to the coast and offshore islands, including bays, estuaries, and lagoons. It also includes the waters and beds of more than 120 rivers, lakes, streams, and sloughs. The State holds these lands for the public trust purposes of water-related commerce, navigation, fisheries, recreation, and open space. SLC may grant dredging permits and issue land use leases for activities within its jurisdiction. SLC does not have a comprehensive use plan for these lands but manages them according to State and Federal laws and regulations. In the primary study area, SLC's jurisdiction includes areas along the Sacramento River north of Red Bluff.

California Fire Plan

The *California Fire Plan* was prepared by the State Board of Forestry and the California Department of Forestry and Fire Protection to provide a comprehensive strategy for wildland fire protection and prevention in California. The plan provides recommendations for fire-safe land use planning. Preventive measures include using fire-resistant building materials, maintaining a defensible space around structures, vegetation management, and infrastructure planning.

Water Quality Control Plan

The *Water Quality Control Plan for the Sacramento River and San Joaquin River Basins* provides water quality objectives to protect beneficial uses of

designated rivers and streams. *Water Quality Control Plan for the Sacramento River and San Joaquin River Basins* objectives are incorporated into county and city general plans, zoning ordinances, and subdivision ordinances.

California Public Resources Code, Sections 5093.50–5093.70

PRC Sections 5093.50–5093.70 were established through 1972 enactment of the State Wild and Scenic Rivers Act, which was subsequently amended on several occasions, to preserve certain rivers that possess extraordinary scenic, recreational, fishery, or wildlife values in their free-flowing state. The PRC identifies, classifies, and provides protection for specific rivers or river segments, as approved by the Legislature. Rivers or river segments that are specifically identified and classified in the PRC compose the State Wild and Scenic Rivers System. As described in PRC Section 5093.50, rivers or river segments included in the State system must possess "extraordinary scenic, recreational, fishery, or wildlife values"; however, the PRC does not define what constitutes "extraordinary."

Depending on the specific conditions of a river, it may be designated as "wild," "scenic," or "recreation." Different segments of a single river can receive different designations; in other words, some segments can be designated wild, some scenic, and some recreation or combinations of these designations. Recreation river segments are readily accessible by road or railroad, may have some development along their shorelines, and may have been impounded or diverted in the past (PRC Section 5093.53).

With its initial passage, the State system protected segments of eight rivers, including two sections of the American River. These sections include the lower American from Nimbus Dam to its confluence with the Sacramento River and the North Fork from its source to the Iowa Hill Bridge. The North Fork section is located above Nimbus, Folsom, and Lake Clementine dams many miles upstream from the confluence with Sacramento River. The North Fork is not regulated by Folsom Dam and would not be affected by hydraulic changes in the Sacramento River. The lower American is designated as a recreational river.

17.2.3 Regional and Local

Shasta County General Plan

The *Shasta County General Plan* (2004) guides land use planning on non-Federal land for Shasta County through 2025. The Community Organization and Development Pattern element of the *Shasta County General Plan* establishes policies related to the organization and relationships of the community types present in Shasta County, the living environments these communities offer, and the locations of development in relation to these communities. These policies were developed to maintain and enhance the quality of their environments. The Community Organization and Development Pattern element includes several objectives that influence land use decisions in the project study area:

- To promote a development pattern that will accommodate, consistent with the other objectives of the plan, the growth that will be experienced by Shasta County

- To guide development in a pattern that will provide opportunities for present and future county residents to enjoy the variety of living environments that currently exist within the county

- To guide development in a pattern that will respect the natural resource values of county lands and their contributions to the county's economic base

- To guide development in a pattern that will minimize land use conflicts between adjacent land users

- To recognize that the major economic resources for achieving the development pattern will come from the private sector, rather than government, and that the general plan, as the expression of community values, will guide the use of these resources

Tehama County General Plan

The *Tehama County General Plan Update 2009–2029* is used to guide future development in unincorporated areas of the county. The Land Use element of the General Plan Update establishes the goals, policies, and implementation measures that will help guide the growth and development of Tehama County for the next 20 years. This element also contains the General Plan Land Use Map, which delineates those areas of the county where future residential development of varying densities and nonresidential growth is anticipated or will be directed (Tehama County 2009).

City of Shasta Lake General Plan

The planning boundaries for the *City of Shasta Lake General Plan* are within the Shasta Lake and vicinity study area, north of Keswick Dam, east of the Sacramento River, and west of I-5. This general plan was adopted in 1999 and is intended to guide land use planning within the city through the Year 2020 (City of Shasta Lake 1999). The following statement from the Land Use element of the general plan identifies some of the concerns surrounding land use decisions within the City of Shasta Lake:

> *The Land Use Element and the Land Use and Circulation Map constitute the physical framework for the general plan, which designates the proposed location, distribution, and extent of land uses. Land use was a specific area of concern identified as being key to the development of the City of Shasta Lake. Some of the major issues identified included an evaluation and establishment of urban, rural, and urban reserve boundaries. This was accomplished by identifying areas that currently lack*

> *infrastructure that would be required to develop in an orderly manner through the development of Area Plans.*

City of Redding General Plan

The planning boundaries for the *City of Redding General Plan* encompass areas within the city limits and the urban growth boundary. This plan was adopted in 2000 and is intended to guide land use planning through the year 2020 (City of Redding 2000). The Community Development and Design element of the general plan states the following about the role and effects of land use policies:

> *Land use policies and the General Plan Diagram affect every property in the City. They determine how people can use/develop their land and what they can reasonably expect to develop next door, down the street, or across town. They provide for overall consistency and compatibility between land uses and can be a determining factor in quality of life. The policies … also have a direct bearing on traffic, the feasibility of public transportation, and the quality of the air.*

City of Anderson General Plan

The planning boundaries of the *City of Anderson General Pla*n encompass areas within the city limits and the urban growth boundary. The City of Anderson released its updated general plan in May 2007 (City of Anderson 2007). The general plan is intended to guide land use planning within the city through the Year 2027. The following statement from the Land Use element of the general plan identifies some of the concerns surrounding land use decisions within the City of Anderson:

> *The Land Use Element describes the pattern of land development within the City of Anderson and the proposed expansion area and provides direction for the future development envisioned for the City. Also included in this Element are descriptions of geographic areas that are anticipated to be developed over the term of this General Plan and goals and policies to guide the City's decision makers in their review of development proposals. This Element also defines land use categories and provides supporting detail for the uses depicted upon the Anderson General Plan Land Use Diagram.*

Red Bluff General Plan

The planning boundaries for the *City of Red Bluff General Plan* encompass areas within the city limits and the urban growth boundary. The adopted General Plan elements are as follows: Circulation element (1991), Housing element (2004), and Land Use, Natural Environment, Noise, and Safety elements (1993). The following statement from the Land Use element

summarizes concerns relative to land use decisions in Red Bluff (City of Red Bluff 1993):

> *The land use element identifies the spatial arrangement of existing and proposed uses of land including public lands and facilities. It lays out the distribution of classes of land use, the intensity of those uses, and proposes a strategy of goals, objectives, policies and implementation measures to promote a wise use of land to promote the welfare of the community.*

17.3 Environmental Consequences and Mitigation Measures

17.3.1 Methods and Assumptions

To characterize existing land uses in the primary study area, pertinent planning documents were reviewed to identify objectives for the level, type, location, density, and intensity of development and to determine whether the alternatives would be in conflict with current plans and policies. Planning documents that were reviewed include the STNF LRMP (USFS 1995), the Management Guide for the NRA, and the general plans for the cities of Shasta Lake, Redding, Anderson, and Red Bluff and Shasta and Tehama counties. Land use maps and zoning maps were consulted to identify planned land uses. The analysis also included a review of aerial photography to determine existing land uses in the primary study area.

The impacts of each alternative are analyzed separately, starting with the analysis of the No-Action Alternative, followed by each of the action alternatives. The impact analysis includes a discussion of both direct and indirect impacts associated with each alternative.

17.3.2 Criteria for Determining Significance of Effects

An environmental document prepared to comply with NEPA must consider the context and intensity of the environmental effects that would be caused by, or result from, the proposed action. Under NEPA, the significance of an effect is used solely to determine whether an EIS must be prepared. An environmental document prepared to comply with CEQA must identify the potentially significant environmental effects of a proposed project. A "[s]ignificant effect on the environment" means a substantial, or potentially substantial, adverse change in any of the physical conditions within the area affected by the project" (State CEQA Guidelines, Section 15382). CEQA also requires that the environmental document propose feasible measures to avoid or substantially reduce significant environmental effects (State CEQA Guidelines, Section 15126.4(a)).

The following significance criteria were developed based on guidance provided by the State CEQA Guidelines and consider the context and intensity of the environmental effects as required under NEPA. Impacts of an alternative related

to land use and planning would be significant if project implementation would do any of the following:

- Create land uses that are incompatible with existing and planned land uses adjacent to actions described as part of the project
- Introduce substantial nuisance effects on sensitive land uses that would disrupt use over an extended time period
- Conflict with any applicable land use plan, policy, ordinance, or regulation of an agency with jurisdiction over the project (including general plans, specific plans, and zoning ordinances) adopted for the purpose of avoiding or mitigating an environmental effect
- Disrupt or divide the physical arrangement of an established community
- Conflict with any applicable habitat conservation or natural community conservation plan

17.3.3 Topics Eliminated from Further Consideration

Effects of the proposed enlargement of Shasta Lake on the listed segments of the American River have been eliminated from further consideration in this DEIS. The listed segment of the North Fork American River has been eliminated because it is above any regulated reaches and is many miles from the confluence of the American and Sacramento rivers. The lower American River has been eliminated because none of the alternatives would adversely affect its designation as a recreational river under the Federal WSRA or the PRC. Under each of the action alternatives, releases from Shasta Dam would increase from late spring through early autumn. Increased releases from Shasta Dam during this period would reduce the volume of water released from Folsom Dam during the primary recreation season on the lower American River (late spring through early autumn). Flow volumes and water levels within the lower American River would, however, remain substantially similar to existing conditions and would remain within the river's typical range of variation during the primary recreation season. During the secondary recreation season (autumn through spring), precipitation is greater, flows in the Sacramento River and Delta are higher, and releases from Shasta Dam would be reduced to increase storage in Shasta Lake. Reclamation may need to occasionally increase releases from Folsom Dam to accommodate demand and offset decreased releases from Shasta Dam. Flow volumes and water levels in the lower American River would, however, remain substantially similar to existing conditions and within the river's typical range of variation during the secondary recreation season.

17.3.4 Direct and Indirect Effects

No-Action Alternative

Shasta Lake and Vicinity, Upper Sacramento River (Shasta Dam to Red Bluff), Lower Sacramento River and Delta, and CVP/SWP Service Areas The impact discussion for the No-Action Alternative addresses all of both the primary and extended study areas together, because this alternative would not affect land use in either the primary or extended study area.

Impact LU-1 (No-Action): Disruption of Existing Land Uses No new facilities would be constructed and no existing facilities would be altered, expanded, or demolished. Therefore, no impact would occur. Mitigation is not required for the No-Action Alternative.

Impact LU-2 (No-Action): Conflict with Existing Land Use Goals and Policies of Affected Jurisdictions No new facilities would be constructed and no existing facilities would be altered, expanded, or demolished. Therefore, no impact would occur. Mitigation is not required for the No-Action Alternative.

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

Shasta Lake and Vicinity and Upper Sacramento River (Shasta Dam to Red Bluff) The impact discussion for CP1 addresses the Shasta Lake and vicinity and upper Sacramento River portions of the primary study area together, because impacts from construction activities would affect both areas.

Impact LU-1 (CP1): Disruption of Existing Land Uses Project construction activities associated with enlarging Shasta Dam and relocating utilities, infrastructure, and public service and recreational facilities could result in short-term and long-term disruptions to land uses by interfering with the ability to use certain lands and interfering with access to certain lands. Construction activities that could disrupt land uses include the transport of project materials to and from project construction sites and the demolition and relocation of some utilities. This impact would be potentially significant.

It is anticipated that construction activities would be limited to the Shasta Lake and vicinity portion of the primary study area; therefore, no impacts associated with disruption of existing land uses would be expected to occur downstream from Shasta Dam.

Construction activities specific to enlarging Shasta Dam would be limited to the existing footprint of the Shasta Dam facilities and areas immediately adjacent. The project construction site would be accessed by existing roadways (I-5, Shasta Dam Boulevard, and Lake Boulevard). The access roads allow commercial truck use and are capable of supporting project-generated traffic. Road modifications would be necessary to accommodate project traffic en route to the construction sites and access restrictions would occur. Noise, air quality,

and traffic impacts along these local roadways are evaluated in separate sections of the DEIS. Equipment staging areas would be sited to avoid affecting or conflicting with existing land uses.

Project construction activities associated with relocating utilities, infrastructure, and public service and recreational facilities could result in temporary and localized disruptions of existing land uses. Lake inundation resulting from future dam operations could result in long-term disruptions of land uses in the primary study area. The Utilities and Miscellaneous Minor Infrastructure Technical Memorandum provides descriptions and detailed maps of the utilities and infrastructure (e.g., roads, bridges, campgrounds, boat ramps) that would be demolished or relocated in the ancillary areas near Shasta Lake (Reclamation 2007). Chapter 18, "Recreation and Public Access," evaluates the project's impacts on recreational use, including short-term disruption of recreational use and or change in the type and location of recreational use. Chapter 21, "Utilities and Service Systems," of this DEIS evaluates the project's impacts on utilities and service systems, and the environmental impacts of utilities demolition and relocation are evaluated in the pertinent technical chapters of the DEIS (e.g., Water Quality, Air Quality and Climate, and Noise and Vibration).

Construction activities would affect major features around Shasta Lake and vicinity and would require demolition, relocation, modification, or reconstruction to prevent inundation of the features caused by an increased reservoir elevation. The major features affected would include:

- Major roads and road segments (Lakeshore Drive realignment)
- Vehicle bridges (Charlie Creek, Doney Creek, McCloud River, Didallas Creek, and Second Creek)
- Railroad bridge
- Utilities and service systems infrastructure
- Campgrounds and picnic areas
- Boat ramps and associated parking areas
- Buildings (resort/marina, residential, USFS facilities)

The communities of Lakeshore and Sugarloaf would be affected the most by transportation infrastructure relocation activities. Seventy-five small road segments (both paved and unpaved) would need to be modified. CP1 would result in the inundation of Lakeshore Drive at numerous locations south of Charlie Creek Bridge and in two locations between the Charlie Creek and Doney Creek bridges. Relocation of Lakeshore Drive and the UPRR would occur near existing residences and businesses. Road construction activity could

result in temporary and localized increases in dust, noise, and construction truck traffic and potential disruption of access.

Seven bridges would need to be replaced. Construction activities associated with bridge modifications and relocations, particularly in areas with existing development such as Bridge Bay Marina and the communities of Lakeshore and Sugarloaf, could result in short-term disruptions of nearby residential, commercial, and industrial land uses. Bridge construction activity could result in temporary and localized increases in dust, noise, and construction truck traffic and potential disruption of access.

Approximately 64,000 feet of power and telecommunications lines would need to be demolished and reconstructed in areas around Shasta Lake. Utilities infrastructure relocation activities could result in short-term disruptions of land uses in communities and recreation areas around Shasta Lake. Relocation activities could require partial or full road closures and other access restrictions to ensure public safety. Utilities relocation activities could also result in temporary and localized increases in dust, noise, heavy equipment traffic, and other project traffic.

An estimated 56 buildings would be affected under a 6.5-foot dam raise. The buildings have been categorized as residential (cottages, homes, etc.), commercial (resorts, marinas, stores, etc.), and USFS sites (work stations, campground buildings, recreation site restrooms, etc.). Buildings within the inundation area would be removed, and some would be relocated. Utilities associated with the removed buildings (water systems, septic systems, telecommunications and power facilities) would also require demolition or abandonment. Construction activity related to removal and/or relocation of buildings would result in temporary and localized increases in dust, noise, and construction truck traffic and potential disruption of access. Some existing marinas would need to be modified or relocated, which would disrupt existing commercial and recreational land uses. See the *Recreation and Public Access Technical Report* for details concerning marina relocations.

Reservoir dikes would be required in the areas of Antlers/Lakeshore and railroad embankments would be required at the UPRR track at the south end of Bridge Bay for protection of existing infrastructure from increased full pool elevations. Additional sites for dike and embankment construction could be added in the future. Dike and embankment construction could serve to lessen long-term land use impacts resulting from the project by eliminating the need to remove and relocate a number of structures. Construction activities associated with dike and embankment construction would result in temporary and localized increases in dust, noise, and construction truck traffic and potential disruption of access.

Project implementation could result in short-term disruptions of land uses of parcels around Shasta Lake and vicinity during construction and relocation

activities; long-term disruptions of land use could also result from project operations. This impact would be potentially significant. Mitigation for this impact is proposed in Section 17.3.5.

Impact LU-2 (CP1): Conflict with Existing Land Use Goals and Policies of Affected Jurisdictions Project implementation would result in inundating land around Shasta Lake, which could conflict with land use goals and policies of affected jurisdictions. Relocation of utilities and service systems resulting from project implementation could also conflict with existing land use goals and policies. This impact would be potentially significant.

It is anticipated that construction activities would be limited to the Shasta Lake and vicinity portion of the primary study area; therefore, no conflicts with existing land use goals and policies would be expected to occur in planning jurisdictions downstream from Shasta Dam.

Project implementation would result in an increase in reservoir pool elevation during extreme storm events, which could result in the flooding of approximately 1,110 acres in the lower elevations around Shasta Lake. To prevent utilities and infrastructure damage, Reclamation would relocate roads, utilities and service systems, marinas, and other structures and would modify a number of bridges. Relocation plans are based on broad assumptions regarding optimum construction, operation, and environmental conditions. Areas planned for relocation activities could have land use designations that conflict with the land use proposed by the project. It is anticipated that some relocation activities would conflict with land use designations. Specific relocation sites are needed before a detailed analysis can be made. Once relocation sites are known, the proposed land use would be compared to the existing land uses and land use designations to determine consistency with the STNF LRMP, the Shasta County General Plan, and the Shasta County Zoning Ordinance as applicable.

Areas that would be most affected by project implementation are located on the Sacramento Arm of Shasta Lake and include the communities of Sugarloaf and Lakeshore. A number of existing residential land uses would be inundated by a higher full pool elevation in Shasta Lake. Residences within 20 feet of the new full pool elevation would be demolished and most would be relocated.

Most recreation facilities that could be inundated by project implementation would be relocated; some recreation facilities would be relocated adjacent to existing recreation facilities. Sites proposed for the relocation of recreational facilities could be inconsistent with the current land use designations. Reclamation would cooperate with USFS to find the most suitable relocation sites that would be consistent with the STNF LRMP and the NRA Management Guide.

The proposed use of Turntable Bay as a developed recreation area would require an amendment to the USFS STNF LRMP (USFS 1995) to change the

land management prescription from Roaded Recreation (Prescription III) to Roaded, High Density Recreation (Prescription IV). Under the USFS Planning Regulations, this would be considered a nonsignificant amendment to the STNF LRMP.

Open space lands would be inundated. STNF LRMP land allocations that would be inundated include Riparian Reserve allocations. Loss of the use of NRA lands would be inconsistent with STNF LRMP and NRA goals and policies. Reclamation would coordinate mitigation measures with USFS to minimize the impacts from losing the ability to use lands around Shasta Lake.

Vegetation clearing required for the relocation of structures, marinas, recreation facilities, and utilities could be inconsistent with the STNF LRMP, the *Shasta County General Plan*, and the Shasta County Zoning Ordinance. Many relocation activities would require vegetation clearing prior to construction. Specific clearing sites would be dependent on the sites chosen for utilities, building, and infrastructure relocation. The sites have not been determined at this time. Once specific relocation sites are known and the areas requiring vegetation clearance are determined, an analysis would be performed to determine whether the proposed action would be inconsistent with the STNF LRMP, the NRA Management Guide, the *Shasta County General Plan*, and the Shasta County Zoning Ordinance. Reclamation would obtain authorization and/or use permits, or other suitable instrument, from USFS for actions within the jurisdiction of USFS; Reclamation would also obtain authorization and/or use permits from Shasta County and the California Department of Forestry and Fire Protection for vegetation clearing activities within the jurisdiction of Shasta County.

It should be noted that even where site-specific land use designations in the NRA conflict with proposed relocation activities, the STNF LRMP identifies 46 resource specific goals for the STNF. One of the key goals is “provide for continued use and new development of hydroelectric facilities.” This implies that specific USFS land allocations that may be inconsistent with relocation activities could be revised or amended for project purposes. However, Reclamation would cooperate with USFS to amend site-specific land use designations, which could require additional NEPA review.

Site-specific information is needed for all infrastructure, building, and utilities relocation plans to review completely for consistency with existing land use planning documents, primarily the STNF LRMP and the *Shasta County General Plan*. Given the magnitude of facilities that might be relocated, including existing marinas, it is anticipated that there would be some inconsistencies with existing planning policies. This impact would be potentially significant. Mitigation for this impact is proposed in Section 17.3.5.

Lower Sacramento River and Delta and CVP/SWP Service Areas
Impact LU-3 (CP1): 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 (CP1): 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.

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

Shasta Lake and Vicinity and Upper Sacramento River (Shasta Dam to Red Bluff) The impact discussion for CP2 addresses the Shasta Lake and vicinity and upper Sacramento River portions of the primary study area together, because impacts from construction activities would affect both areas.

Impact LU-1 (CP2): Disruption of Existing Land Uses Project construction activities associated with enlarging Shasta Dam and relocating utilities, infrastructure, and public service and recreational facilities could result in short-term and long-term disruptions to land uses by interfering with the ability to use certain lands and interfering with access to certain lands. Construction activities that could disrupt land uses include the transport of project materials to and from project construction sites. Limitation on site use associated with construction at a particular site or facility would also occur. This impact would be potentially significant.

This impact would be similar to Impact LU-1 (CP1). A dam raise of 12.5 feet would result in a larger area of inundation than under CP1, which would, in turn, result in additional relocation of existing structures, infrastructure, and utilities and a longer duration for the impact. Reclamation estimates the construction of CP2 would take 5 years, which would be 6 months longer than for CP1. CP2 would, therefore, result in longer term disruptions of land use than would CP1. Approximately 500 additional acres would be inundated by CP2, totaling 1,750 acres of land that would be inundated by Shasta Dam operations. Specific information regarding the location and number of structures that would be permanently lost will be incorporated into the land use impact analysis.

Project implementation could result in short-term and long-term disruptions of existing land uses. Therefore, this impact would be potentially significant. Mitigation for this impact is proposed in Section 17.3.5.

Impact LU-2 (CP2): Conflict with Existing Land Use Goals and Policies of Affected Jurisdictions Project implementation could result in a permanent loss of inundated land around Shasta Lake, which could conflict with land use goals

and policies of affected jurisdictions. Relocation of utilities and service systems resulting from project implementation could also conflict with existing land use goals and policies. This impact would be potentially significant.

This impact would be similar to Impact LU-2 (CP1). A dam raise of 12.5 feet would create a larger area of inundation than under CP1, which, compared to CP1, would result in additional relocation of structures and infrastructure that would be subject to USFS and Shasta County land use goals and policies. A site-specific analysis would be conducted to determine where relocation activities and permanent land base losses resulting from project implementation would be inconsistent with the STNF LRMP, the NRA Management Guide, the *Shasta County General Plan,* and the Shasta County Zoning Ordinance.

Project implementation could result in short-term and long-term impacts that could conflict with existing land use goals and policies. Therefore, this impact would be potentially significant. Mitigation for this impact is proposed in Section 17.3.5.

Lower Sacramento River and Delta and CVP/SWP Service Areas
Impact LU-3 (CP2): 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 (CP2): 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.

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

Shasta Lake and Vicinity and Upper Sacramento River (Shasta Dam to Red Bluff) The impact discussion for CP3 addresses the Shasta Lake and vicinity and upper Sacramento River portions of the primary study area together, because impacts from construction activities would affect both areas.

Impact LU-1 (CP3): Disruption of Existing Land Uses Project construction activities associated with enlarging Shasta Dam and relocating utilities, infrastructure, and public service and recreational facilities could result in short-term and long-term disruptions to land uses by interfering with the ability to use certain lands and interfering with access to certain lands. Construction activities that could disrupt land uses include the transport of project materials to and from project construction sites. Limitation on site use associated with construction at a particular site or facility would also occur. This impact would be potentially significant.

This impact would be similar to Impact LU-1 (CP1). A dam raise of 18.5 feet would result in a larger area of inundation than under CP1, which would result in additional relocation of existing structures and infrastructure compared to CP1 and a longer duration for the impact. Reclamation estimates that construction of CP3 would take 60 months, which would be 6 months longer than for CP1. Approximately 2,500 acres of land would be inundated by CP3 and, according to the 2003 infrastructure inventory at Shasta Lake, an estimated 160 buildings would be inundated under an 18.5-foot dam raise (Shasta County 2003). Specific information regarding the location and number of structures that would be permanently lost would be incorporated into the land use impact analysis. CP3 would require a more extensive (longer and wider) system of reservoir dikes than CP1 to accommodate increased Shasta Lake elevations resulting from Shasta Dam operations. A dam raise of 18.5 feet would result in the encroachment of 100 road segments. Lakeshore Drive could be inundated for nearly its entire length between Charlie Creek and Doney Creek.

Project implementation could result in short- and long-term disruptions of existing land uses. Therefore, this impact would be potentially significant. Mitigation for this impact is proposed in Section 17.3.5.

Impact LU-2 (CP3): Conflict with Existing Land Use Goals and Policies of Affected Jurisdictions Project implementation could result in a permanent loss of inundated land around Shasta Lake, which could conflict with land use goals and policies of affected jurisdictions. Relocation of utilities and service systems resulting from project implementation could also conflict with existing land use goals and policies. This impact would be potentially significant.

This impact would be similar to Impact LU-2 (CP1). A dam raise of 18.5 feet would result in a larger area of inundation than CP1, which, compared to CP1, would result in additional relocation of existing structures and infrastructure that would be subject to existing USFS and Shasta County land use goals and policies. A site-specific analysis would be conducted to determine where relocation activities and permanent land base losses resulting from project implementation would be inconsistent with the STNF LRMP, the NRA Management Guide, the *Shasta County General Plan,* and the Shasta County Zoning Ordinance.

Project implementation could result in short-term and long-term impacts that could conflict with existing land use goals and policies. Therefore, this impact would be potentially significant. Mitigation for this impact is proposed in Section 17.3.5.

Lower Sacramento River and Delta and CVP/SWP Service Areas

Impact LU-3 (CP3): 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 (CP3): 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.

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

Shasta Lake and Vicinity and Upper Sacramento River (Shasta Dam to Red Bluff) The impact discussion for CP4 addresses the Shasta Lake and vicinity and upper Sacramento River portions of the primary study area together, because impacts from construction activities would affect both areas.

Impact LU-1 (CP4): Disruption of Existing Land Uses Project construction activities associated with enlarging Shasta Dam and relocating utilities, infrastructure, and public service and recreational facilities could result in short-term and long-term disruptions to land uses by interfering with the ability to use certain lands and interfering with access to certain lands. Gravel augmentation and the habitat restoration activities along the upper Sacramento River could also cause minor disruptions of existing land uses in the primary study area. Construction activities that could disrupt land uses include the transport of project materials and equipment to and from project construction sites. Limitation on site use associated with construction at a particular site or facility would also occur. This impact would be potentially significant.

This impact would be similar to Impact LU-1 (CP1). Therefore, this impact would be potentially significant. Mitigation for this impact is proposed in Section 17.3.5.

Impact LU-2 (CP4): Conflict with Existing Land Use Goals and Policies of Affected Jurisdictions Project implementation could result in a permanent loss of inundated land around Shasta Lake, which could conflict with land use goals and policies of affected jurisdictions. Relocation of utilities and service systems resulting from project implementation could also conflict with existing land use goals and policies, resulting in a significant impact. Gravel augmentation and the habitat restoration activities along the upper Sacramento River would not alter land uses and would not be expected to conflict with existing land use goals and policies. This impact would be potentially significant.

This impact would be similar to Impact LU-2 (CP1). Therefore, this impact would be potentially significant. Mitigation for this impact is proposed in Section 17.3.5.

Lower Sacramento River and Delta and CVP/SWP Service Areas

Impact LU-3 (CP4): 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 (CP4): 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.

CP5 – 18.5-Foot Dam Raise, Combination Plan

Shasta Lake and Vicinity and Upper Sacramento River (Shasta Dam to Red Bluff) The impact discussion for CP5 addresses the Shasta Lake and vicinity and upper Sacramento River portions of the primary study area together, because impacts from construction activities would affect both areas.

Impact LU-1 (CP5): Disruption of Existing Land Uses Project construction activities associated with enlarging Shasta Dam and relocating utilities, infrastructure, and public service and recreational facilities could result in short-term and long-term disruptions to land uses by interfering with the ability to use certain lands and interfering with access to certain lands. Gravel augmentation and the habitat restoration activities along the upper Sacramento River could also cause minor disruptions of existing land uses in the primary study area. Construction activities that could disrupt land uses include the transport of project materials and equipment to and from project construction sites. Limitation on site use associated with construction at a particular site or facility would also occur. This impact would be potentially significant.

This impact would be similar to Impact LU-1 (CP1). Therefore, this impact would be potentially significant. Mitigation for this impact is proposed in Section 17.3.5.

Impact LU-2 (CP5): Conflict with Existing Land Use Goals and Policies of Affected Jurisdictions Project implementation could result in a permanent loss of inundated land around Shasta Lake, which could conflict with land use goals and policies of affected jurisdictions. Relocation of utilities and service systems resulting from project implementation could also conflict with existing land use goals and policies, resulting in a significant impact. Gravel augmentation and the habitat restoration activities along the upper Sacramento River would not alter land uses and would not be expected to conflict with existing land use goals and policies. This impact would be potentially significant.

This impact would be similar to Impact LU-2 (CP-1). Therefore, this impact would be potentially significant. Mitigation for this impact is proposed in 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

No-Action Alternative

No mitigation measures are required for this alternative.

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

No mitigation is required for Impacts LU-3 (CP1) and LU-4 (CP1). Mitigation is provided below for the impacts of CP1 on land uses in the primary study area.

Mitigation Measure LU-1 (CP1): Minimize and/or Avoid Temporary Disruptions to Local Communities To minimize and/or avoid temporary disruption to local communities, the following measures will be implemented during project construction:

- Prior to construction, Reclamation and its contractor will develop a construction plan for each affected community (i.e., Lakeshore, Sugarloaf), consisting of the following:
  - Alternate access routes will be identified for local residences and businesses affected by project construction activities.
  - Construction and staging areas will be fenced, secured, and clearly marked. Security will be provided to ensure public safety.
  - Public parking areas outside of the construction staging areas will be kept clear of construction-related equipment of materials at all times.
  - Any open trenches will be covered or secured after daily activities to protect worker and public safety.
  - Construction activities near noise-sensitive land uses (e.g., near residences, campgrounds) or land uses that experience high levels of public activity (e.g., boat ramps, marinas) will be restricted to days and hours that minimize land use conflicts to the extent feasible.
- The contractor will provide advance notice of the construction activities schedule to the affected community members (e.g., residences, property owners, business owners, and public facilities operators), including posting of signs in the project area.
- The contractor will provide a phone number and community contact for inquiries about the project throughout the construction period.
- Reclamation and its contractor will coordinate with local jurisdictions and obtain all necessary permits (e.g., encroachment permit, utility excavation permit), will comply with permit conditions established to

minimize construction impacts, and will assign an inspector to the project to oversee construction activities.

Implementation of this mitigation measure would substantially reduce land use capability impacts generated by short-term construction activities, but might not reduce all impacts to a less-than-significant level. As a result, Impact LU-1 (CP1) would be significant and unavoidable.

Mitigation Measure LU-2 (CP1): Minimize and/or Avoid Conflicts with Land Use Goals and Policies To reduce conflicts with land use goals and policies of affected jurisdictions, Reclamation will implement the following measures:

- Reclamation will coordinate with USFS to find the most suitable relocation sites for recreation facilities with respect to consistency with the STNF LRMP and the NRA Management Guide.

- Reclamation will coordinate with USFS to identify measures to minimize the impacts of the loss of use of USFS lands around Shasta Lake (including open space and Riparian Reserve allocations) caused by inundation, and measures to offset inconsistencies with the STNF LRMP and NRA goals and policies related to the loss of use of NRA lands.

- As utility and facility relocation sites are being refined, Reclamation will evaluate consistency of the relocated land uses with the STNF LRMP, the NRA Management Guide, the Shasta County General Plan, and the county zoning ordinance. To the degree possible, Reclamation will design the relocated utilities and facilities to comply with these plans and ordinances. If needed, Reclamation will seek permits, easements, and or plan amendments.

Implementation of this mitigation measure would substantially reduce land use plan consistency impacts, but might not reduce all impacts to a less-than-significant level. As a result, Impact LU-2 (CP1) would be significant and unavoidable.

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

No mitigation is required for Impacts LU-3 (CP2) and LU-4 (CP2). Mitigation is provided below for the impacts of CP2 on land uses in the primary study area.

Mitigation Measure LU-1 (CP2): Minimize and/or Avoid Temporary Disruptions to Local Communities This mitigation measure is identical to Mitigation Measure LU-1 (CP1). Implementation of this mitigation measure would substantially reduce land use capability impacts generated by short-term construction activities, but might not reduce all impacts to a less-than-

significant level. As a result, Impact LU-1 (CP2) would be significant and unavoidable.

Mitigation Measure LU-2 (CP2): Minimize and/or Avoid Conflicts with Land Use Goals and Policies This mitigation measure is identical to Mitigation Measure LU-2 (CP1). Implementation of this mitigation measure would substantially reduce land use plan consistency impacts, but might not reduce all impacts to a less-than-significant level. As a result, Impact LU-2 (CP2) would be significant and unavoidable.

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

No mitigation is required for Impacts LU-3 (CP3) and LU-4 (CP3). Mitigation is provided below for the impacts of CP3 on land uses in the primary study area.

Mitigation Measure LU-1 (CP3): Minimize and/or Avoid Temporary Disruptions to Local Communities This mitigation measure is identical to Mitigation Measure LU-1 (CP1). Implementation of this mitigation measure would substantially reduce land use capability impacts generated by short-term construction activities, but might not reduce all impacts to a less-than-significant level. As a result, Impact LU-1 (CP3) would be significant and unavoidable.

Mitigation Measure LU-2 (CP3): Minimize and/or Avoid Conflicts with Land Use Goals and Policies This mitigation measure is identical to Mitigation Measure LU-2 (CP1). Implementation of this mitigation measure would substantially reduce land use plan consistency impacts, but might not reduce all impacts to a less-than-significant level. As a result, Impact LU-2 (CP3) would be significant and unavoidable.

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

No mitigation is required for impacts LU-3 and LU-4 in the extended study area. Mitigation is provided below for the impacts of CP4 on land uses in the primary study area.

Mitigation Measure LU-1 (CP4): Minimize and/or Avoid Temporary Disruptions to Local Communities This mitigation measure is identical to Mitigation Measure LU-1 (CP1). Implementation of this mitigation measure would substantially reduce land use capability impacts generated by short-term construction activities, but might not reduce all impacts to a less-than-significant level. As a result, Impact LU-1 (CP4) would be significant and unavoidable.

Mitigation Measure LU-2 (CP4): Minimize and/or Avoid Conflicts with Land Use Goals and Policies This mitigation measure is identical to Mitigation Measure LU-2 (CP1). Implementation of this mitigation measure would substantially reduce land use plan consistency impacts, but might not

reduce all impacts to a less-than-significant level. As a result, Impact LU-2 (CP4) would be significant and unavoidable.

CP5 – 18.5-Foot Dam Raise, Combination Plan

No mitigation is required for impacts LU-3 and LU-4 for the extended study area. Mitigation is provided below for the impacts of CP5 on land uses in the primary study area.

Mitigation Measure LU-1 (CP5): Minimize and/or Avoid Temporary Disruptions to Local Communities This mitigation measure is identical to Mitigation Measure LU-1 (CP1). Implementation of this mitigation measure would substantially reduce land use capability impacts generated by short-term construction activities, but might not reduce all impacts to a less-than-significant level. As a result, Impact LU-1 (CP5) would be significant and unavoidable.

Mitigation Measure LU-2 (CP5): Minimize and/or Avoid Conflicts with Land Use Goals and Policies This mitigation measure is identical to Mitigation Measure LU-2 (CP1). Implementation of this mitigation measure would substantially reduce land use plan consistency impacts, but might not reduce all impacts to a less-than-significant level. As a result, Impact LU-2 (CP5) would be significant and unavoidable.

17.3.6 Cumulative Effects

The action alternatives could temporarily affect land use in the Shasta Lake and vicinity portion of the primary study area during construction, and some components might be inconsistent with the STNF LRMP, the NRA Management Guide, the *Shasta County General Plan*, and the county zoning ordinance. Only two of the present or reasonably foreseeable future actions are located in the immediate vicinity of Shasta Lake and have the potential to conflict with land uses that might also be affected by construction of the action alternatives. These actions are the Antlers Bridge replacement and the Iron Mountain Mine Restoration Plan. The Antlers Bridge replacement is currently under construction and is expected to be completed in 2015, which is before any of the action alternatives would begin. With respect to the Iron Mountain Mine Restoration Plan, it is unlikely that this activity would occur simultaneously with the action alternatives, or would considerably and adversely affect use of the same land. Therefore, construction activities related to implementation of the proposed SLWRI alternatives would not contribute considerably to significant cumulative impacts related to temporary land use impacts. The cumulative effects of the action alternatives and the two present or reasonably foreseeable future actions on resources managed consistent with the STNF LRMP, the NRA Management Guide, the *Shasta County General Plan*, and the county zoning ordinance are addressed in the other pertinent technical chapters of the DEIS.

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