

1 **Chapter 22**
2 **Public Services**

3 **22.1 Affected Environment**

4 This section describes the affected environment related to public
5 services for the dam and reservoir modifications proposed under SLWRI
6 action alternatives. The public services addressed are fire protection,
7 emergency services, law enforcement, and schools. Utilities, sewer
8 services, and water supply are analyzed in Chapter 21, “Utilities and
9 Service Systems,” of this DEIS.

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

18 The public services setting for Shasta Lake and vicinity consists of the
19 portion of Shasta County above Shasta Dam. Public services needs in
20 this region are influenced by rugged, mountainous terrain, rural lakeside
21 communities, and Shasta Lake. The public services setting for the upper
22 Sacramento River portion of the primary study area consists of Shasta
23 County below Shasta Dam and Tehama County. Public services needs in
24 this area are influenced by topography and population densities. Four
25 incorporated cities—the Cities of Shasta Lake, Redding, Anderson, and
26 Red Bluff—create an urban setting in the otherwise rural upper
27 Sacramento Valley, which is characterized by rolling hills with
28 mountains to the north, east, and west.

29 The public services setting for the extended study area consists of 24
30 counties downstream from Red Bluff and encompasses all areas served
31 by the CVP and the SWP.

32 Table 22-1 lists the public service providers considered in this DEIS.

33

1

Table 22-1. Key Public Service Providers

Fire Protection Services
U.S. Forest Service
California Department of Forestry and Fire Protection
Shasta County Fire Department
Tehama County Fire Department
Redding Fire Department
Shasta Lake Fire Protection District
Anderson Fire Protection District
Red Bluff Fire Department
Corning Volunteer Fire Department
Emergency Services
California Highway Patrol
California Office of Emergency Services
Shasta County Sheriff's Office
Tehama County Sheriff's Department
Shasta Area Safety Communications Agency
Shasta Regional Medical Center
Mercy Medical Center Redding
Shasta Community Health Center
St. Elizabeth Community Hospital
Law Enforcement
U.S. Forest Service
U.S. Bureau of Land Management
California Highway Patrol
California Department of Fish and Wildlife
Shasta County Sheriff's Office
Tehama County Sheriff's Department
Red Bluff Police Department
Corning Police Department
Schools
Gateway Unified School District

2

3 **22.1.1 Fire Protection Services**

4 Fire protection services consist of fire suppression, emergency
 5 dispatching, specialized training, fire prevention, fire safety education,
 6 and emergency medical response. Chapter 9 (Hazards and Hazardous
 7 Materials and Waste) describes the fire risk and provides historic fire
 8 data for the primary and extended study areas.

1 **Shasta Lake and Vicinity**

2 The Shasta County Fire Department (SCFD) and the California
3 Department of Forestry and Fire Protection (Cal Fire) respond to
4 nonwildland fires in the Shasta Lake and vicinity portion of the primary
5 study area. Nonwildland fires consist of structural, chemical, petroleum,
6 electrical, vehicle, and other fires that involve human-made materials.
7 Cal Fire and USFS are responsible primarily for wildland fires, which
8 consist of fires in vegetated areas such as forests, chaparral, and
9 grassland.

10 Cal Fire and USFS generally respond according to established
11 jurisdictional boundaries. Under an agreement with the U.S. Department
12 of the Interior, Bureau of Land Management (BLM), Cal Fire provides
13 fire protection resources for lands managed by BLM throughout the
14 primary study area. Additionally, a fire protection agreement between
15 Cal Fire and USFS provides for the sharing of fire protection resources
16 to augment the capabilities of each agency (USFS 1995). In practice,
17 SCFD, Cal Fire, and USFS provide mutual assistance when needed.

18 The National Interagency Fire Center, located in Boise, Idaho, assists
19 with wildland fire suppression nationwide. The center represents a
20 collaboration among seven Federal agencies: the Bureau of Indian
21 Affairs, BLM, USFS, USFWS, the National Park Service, the National
22 Weather Service, and the Office of Aircraft Services. These agencies
23 work together to coordinate and support wildland fire and disaster
24 operations. Cal Fire and the California Emergency Management Agency
25 (Cal EMA) (formerly Governor’s Office of Emergency Services (OES))
26 work closely with these agencies to manage wildland fire operations.

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

28 Fire protection services in the upper Sacramento River portion of the
29 primary study area are similar to those in the Shasta Lake and vicinity
30 portion. SCFD and the Tehama County Fire Department (TCFD) are
31 responsible primarily for nonwildland fires, and Cal Fire and USFS
32 respond primarily to wildland fires.

33 In Shasta County, the Redding Fire Department, SCFD, and Cal Fire
34 have mutual aid agreements to ensure adequate fire protection services
35 and to share resources. Under these agreements, the agencies respond to
36 emergencies in Shasta County that are in adjacent jurisdictions.

37 Fire departments serving the unincorporated areas of Shasta County
38 include 1 SCFD station that is housed in Redding, 12 community fire
39 districts, and 19 volunteer fire companies. Cal Fire operates several fire
40 stations during the off-season winter months, through an agreement with
41 BLM and local fire departments. The community fire districts operate

1 autonomously; the remaining fire departments, fire stations, and the
2 Shasta County Fire District fall under the jurisdiction of SCFD.

3 The Cities of Shasta Lake, Redding, and Anderson are incorporated
4 cities in Shasta County. Fire protection in Redding is provided by the
5 Redding Fire Department, which has 8 fully equipped stations and 72
6 full-time employees. The City of Shasta Lake provides fire protection,
7 supported by 3 fire stations with 27 employees. The Anderson Fire
8 Protection District provides service to Anderson and operates 2 fire
9 stations with 15 employees.

10 Shasta and Tehama counties share fire protection resources along their
11 shared county line, through a mutual aid agreement. Like SCFD, TCFD
12 has mutual aid agreements with local fire protection agencies that
13 operate in the county. One difference between Shasta and Tehama
14 counties is the level of integration with Cal Fire: TCFD is fully
15 integrated with Cal Fire, which administers fire protection services in all
16 unincorporated areas of the county except for the areas covered by the
17 Gerber and Capay fire protection districts.

18 TCFD provides fire protection services for the residents of Tehama
19 County through a network of 16 fire stations and 15 volunteer fire
20 companies. Five of the stations, Los Molinos, Corning, Bowman, El
21 Camino, and Antelope, are staffed 24 hours a day, year round. The
22 distribution of stations places most residents of Tehama County within
23 5 road miles of a responding fire station.

24 Red Bluff and Corning are incorporated cities in Tehama County; both
25 cities provide fire protection services for their residents. Fire protection
26 in Red Bluff is provided by the Red Bluff Fire Department. The Corning
27 Volunteer Fire Department, which employs full-time staff assisted by
28 volunteers, provides fire protection for the incorporated area of Corning.

29 Other fire protection services in Tehama County include the Gerber Fire
30 Protection District, Lassen Volcanic National Park, Capay Fire
31 Protection District, and Cottonwood Fire Protection District.

32 ***Lower Sacramento River and Delta and CVP/SWP Service Areas***
33 Fire protection services in the extended study area are similar to those
34 discussed for the primary study area. However, urban population
35 densities are higher in parts of the extended study area, which influences
36 the types and extent of the fire protection services that are provided.
37 Cities and counties in the extended study area provide fire protection
38 services primarily for nonwildland fires, and Cal Fire and USFS provide
39 fire protection services primarily for wildland fires.

1 **22.1.2 Emergency Services**

2 Emergency services consist of emergency preparation, response, and
3 recovery efforts. Emergencies range from calls for medical assistance to
4 individuals, to large-scale disasters, such as evacuations resulting from
5 wildland fires and floods.

6 ***Shasta Lake and Vicinity***

7 The Shasta County Sheriff’s Office (SCSO) is responsible for
8 coordinating emergency services on Shasta Lake and in the
9 unincorporated areas of Shasta County upstream from Shasta Dam.
10 Large-scale emergency services are handled by SCSO, in cooperation
11 with the State emergency response network run by Cal EMA. As of
12 1996, OES (now Cal EMA) had designated emergency service
13 “Operational Areas” for all California counties, cities, and special
14 districts (e.g., school, water, and waste reclamation districts). Shasta
15 Lake and vicinity is located in the Region 3 Operational Area, which
16 consists of 12 Northern California counties. Emergency services
17 providers can be called on to assist with emergencies that occur in their
18 designated region and to assist the Central and South emergency
19 services regions. Cal Fire, USFS, BLM, the Federal Emergency
20 Management Agency, and the American Red Cross also provide
21 assistance in large-scale emergencies.

22 SCSO provides emergency services, including patrol boats and deputies,
23 at Shasta Lake from a substation at Bridge Bay Marina. Medical aid is
24 provided by Shasta County fire departments and private ambulance
25 companies, including land and air ambulance services, based in the
26 Redding area.

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

28 Emergency services in the upper Sacramento River area are similar to
29 those described in the previous section. SCSO is responsible for
30 coordinating emergency services in the Shasta County part of the upper
31 Sacramento River area, and the Tehama County Sheriff’s Department is
32 responsible for coordinating emergency services in the Tehama County
33 part. Both county agencies coordinate emergency services with Cal
34 EMA and serve as the emergency services headquarters during declared
35 public emergencies.

36 A number of emergency services agencies in Shasta County have
37 formed a joint-powers agency, called the Shasta Area Safety
38 Communications Agency, to consolidate emergency services related to
39 fire, medical services, and law enforcement. Current participants include
40 the Redding Fire Department, the Redding Police Department, and
41 SCSO. American Medical Response, Redding Medical Center, and
42 Mercy Medical Center in Redding participate in the Shasta Area Safety
43 Communications Agency under a contractual agreement for ambulance

1 services. Emergency medical response is also provided by St. Elizabeth
2 Community Hospital in Red Bluff.

3 The Tehama County Sheriff's Department is responsible for emergency
4 services coordination in Tehama County. In addition, TCFD responds to
5 some medical emergencies in Tehama County.

6 The California Highway Patrol (CHP), Northern Division, provides
7 ground and air support for emergencies along the Interstate 5 (I-5)
8 corridor and State highways throughout the primary study area. CHP
9 maintains two A-star helicopters and two Cessna airplanes that are used
10 to assist other agencies with search and rescue, and fire response. In
11 addition, CHP assists with traffic control during emergencies.

12 Emergency services in the upper Sacramento River area are also
13 supplemented by Cal Fire, USFS, the Federal Emergency Management
14 Agency, and the American Red Cross.

15 Several hospitals and other facilities in Shasta and Tehama County
16 provide emergency and urgent care services. Shasta Regional Medical
17 Center, Mercy Medical Center Redding, and Shasta Community Health
18 Center are located in Redding and serve the Shasta Lake and Redding
19 areas. St. Elizabeth Community Hospital is located in Red Bluff and
20 serves Tehama County.

21 ***Lower Sacramento River and Delta and CVP/SWP Service Areas***
22 Emergency services in the extended study area are similar to those
23 discussed for the primary study area. Cities and counties in the extended
24 study area are primarily responsible for providing emergency services,
25 and they receive assistance from regional, State, and Federal agencies
26 for emergencies that require resources beyond the capability of the local
27 jurisdiction.

28 **22.1.3 Law Enforcement**

29 Law enforcement services consist of crime prevention, investigation,
30 and apprehension of lawbreakers and include duties to keep the peace
31 and protect life and property. Law enforcement agencies often enter into
32 cooperative aid agreements with neighboring or overlapping law
33 enforcement jurisdictions to consolidate resources and facilitate
34 communication.

35 ***Shasta Lake and Vicinity***

36 Law enforcement services in the Shasta Lake and vicinity portion of the
37 primary study area are provided by SCSO, CHP, CDFW, BLM, and
38 USFS. In general, the nature of an offense or law enforcement duty
39 establishes jurisdiction. SCSO has primary responsibility for conflicts
40 between people and most violations of State law, CHP handles most

1 traffic violations, CDFW enforces State fish and game laws, and
2 BLM/USFS handle violations of Federal law.

3 Agencies responsible for law enforcement on Shasta Lake and the
4 surrounding area carry out their duties from several locations. SCSO
5 operates a substation in the city of Shasta Lake with nine assigned
6 deputies and another substation in Lakehead with two resident deputies.
7 Because of the nature and volume of human activity around Shasta
8 Lake, SCSO also maintains a substation at Bridge Bay Marina, located
9 on the main dock above the store. SCSO's boat dock is located on the
10 main dock near the substation. Services provided by SCSO include
11 search and rescue, safety patrol boats, boating safety education,
12 emergency services, and animal control.

13 USFS and BLM use Federal law enforcement officers with jurisdiction
14 on Federal lands. USFS and BLM do not assume the Sheriff's
15 responsibilities; instead, they enforce the Federal codes that govern
16 public behavior on lands managed by USFS and BLM. The CDFW
17 Northern District enforcement unit is based in Redding and provides law
18 enforcement related to State fish and game laws in Shasta, Trinity, and
19 Tehama counties.

20 Traffic law enforcement along I-5, State routes, and State highways is
21 provided primarily by the Northern Division of CHP. CHP operates
22 several offices in the primary study area, including offices in Redding
23 and Red Bluff.

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

25 Reclamation's Security, Safety and Law Enforcement (SSLE) Office,
26 located in Denver, is responsible for protecting the public, Reclamation
27 employees, and Reclamation facilities through the development and
28 implementation of an integrated security, safety, and law enforcement
29 program. The SSLE Office manages security, safety, and law
30 enforcement for Reclamation programs and projects such as Shasta
31 Dam; develops Reclamation-wide policies and guidelines governing
32 these programs; and provides oversight of program execution in
33 Reclamation field offices.

34 SCSO provides law enforcement services for the unincorporated areas of
35 Shasta County. County law enforcement operations are based in
36 Redding. Sheriff substations are located in Burney, the city of Shasta
37 Lake, and Shingletown. The incorporated cities of Redding and
38 Anderson provide law enforcement services for their residents. USFS
39 and BLM use Federal law enforcement officers with jurisdiction on
40 Federal lands.

1 The Tehama County Sheriff’s Department office is located in Red Bluff.
2 The sheriff is the chief law enforcement officer of Tehama County, with
3 jurisdiction throughout the unincorporated county, the incorporated
4 cities, and State-owned property. The incorporated cities of Red Bluff
5 and Corning provide law enforcement services for their residents.

6 ***Lower Sacramento River and Delta and CVP/SWP Service Areas***
7 Law enforcement services in the extended study area are similar to those
8 discussed for the primary study area. Counties maintain sheriff’s
9 departments that have jurisdiction within the county boundaries, and
10 incorporated cities maintain police departments that have jurisdiction
11 within the city limits. However, urban population densities are higher in
12 parts of the extended study area, which influences the types and extent
13 of law enforcement services provided. USFS and BLM use Federal law
14 enforcement officers with jurisdiction on Federal lands.

15 **22.1.4 Schools**

16 School districts are autonomous entities responsible for providing
17 educational services for elementary, middle school, and high school
18 students. Districts elect their own governing boards and appoint their
19 own superintendents. County offices of education assist the school
20 districts with administrative and curricular support.

21 ***Shasta Lake and Vicinity***
22 No schools are located in the Shasta Lake and vicinity portion of the
23 primary study area. The Gateway Unified School District serves
24 residents in this area and previously operated Canyon Elementary in
25 Lakehead. This school, however, is currently closed.

26 ***Upper Sacramento River (Shasta Dam to Red Bluff)***
27 School districts in the upper Sacramento River area serve students in
28 levels kindergarten through grade 12. Shasta County is served by 25
29 school districts, and Tehama County is served by 21 school districts.
30 The California Community College system provides continuing
31 education services at locations in Shasta County and Tehama County.
32 Simpson University, located in Redding, also provides college-level
33 educational services.

34 The Gateway Unified School District operates several schools in Shasta
35 County. Mountain Lakes High School (grades 10 through 12) and Shasta
36 Lake Alternative School (kindergarten through grade 12) are located at
37 the northeast corner of the intersection of Lake Boulevard and Shasta
38 Dam Boulevard.

39 ***Lower Sacramento River and Delta and CVP/SWP Service Areas***
40 Educational services in the extended study area are similar to those
41 discussed for the primary study area. Cities and counties form school

1 districts to provide educational services for children between 6 and 18
2 years of age. Numerous community colleges and 4-year colleges and
3 universities are also located in the extended study area. Urban
4 population densities are higher in parts of the extended study area, which
5 influences the variety of educational services provided.

6 **22.2 Regulatory Framework**

7 **22.2.1 Federal**

8 ***Shasta-Trinity National Forest Land and Resource Management*** 9 ***Plan***

10 USFS personnel conduct their responsibilities for regulating the use of
11 and protecting national forest lands under Title 36 and sections of Titles
12 16, 18, and 21 of the Code of Federal Regulations. Public services
13 directives from the Code of Federal Regulations are integrated into the
14 Shasta-Trinity National Forest Land and Resource Management Plan
15 (LRMP), which includes the following topics: fire and fuels
16 management, facilities management, law enforcement, and land
17 management.

18 The LRMP identifies goals, standards, and guidelines related to public
19 services in Shasta-Trinity National Forest. The following goals,
20 standards, and guidelines related to public services in Shasta-Trinity
21 National Forest have been excerpted from the LRMP (USFS 1995):

22 **Fire and Fuels Goals (LRMP, p. 4-4)**

- 23 • Achieve a balance of fire suppression capability and fuels
24 management investments that are cost effective and able to meet
25 ecosystem objectives and protection responsibilities.

26 **Fire and Fuels Standards and Guidelines (LRMP, p. 4-17)**

- 27 • Wildland fires will receive an appropriate suppression response
28 that may range from confinement to control. Unless a different
29 suppression response is authorized in this plan, or subsequent
30 approved plans, all suppression responses will have an objective
31 of “control.”
- 32 • All wildland fires, on or threatening private land protected by
33 agreement with the State of California, will receive a “control”
34 suppression response.
- 35 • Fire prevention efforts will be designed to minimize human-
36 caused wildfires commensurate with the resource values at risk.

1 **Facilities Goals (LRMP, p. 4-4)**

- 2 • Provide and maintain those administrative facilities that
3 effectively and safely serve the public and USFS workforce.

4 **Facilities Standards and Guidelines (LRMP, p. 4-17)**

- 5 • Manage, construct, and maintain buildings and administrative
6 sites to meet applicable codes and to provide the necessary
7 facilities to support resource management.
- 8 • Closure of roads and/or selected areas to assist in management
9 of Forest resources may be made by regulatory and/or physical
10 devices on the road for the following purpose[s]: safety, fire,
11 and general administrative purposes.

12 **Law Enforcement Goals (LRMP, p. 4-5)**

- 13 • Establish priority in law enforcement activities as follows: (a)
14 provide for employee and public safety, (b) protect resources
15 and property, (c) provide for the accomplishment of
16 management objectives, and (d) prevent violation of laws and
17 associated loss and damage.

18 **Law Enforcement Standards and Guidelines (LRMP, p. 4-21)**

- 19 • Protect the public interest by a thorough and aggressive
20 program of violation prevention, violation detection,
21 investigation and apprehension of violators, and prosecution.

22 ***U.S. Bureau of Land Management Resource Management Plan***

23 BLM manages a number of public lands adjacent to the Sacramento
24 River corridor downstream from Shasta Dam. The study area falls under
25 two BLM districts (Northern California and Central California) and the
26 resource management plans of three BLM field offices: Redding, Ukiah,
27 and Mother Lode (BLM 2006a). The purpose of BLM's resource
28 management plans is to provide overall direction for managing and
29 allocating public resources in each planning area. The Resource
30 Management Plan (RMP) for the Redding field office states that any fire
31 occurring on public lands would be suppressed.

32 **22.2.2 State**

33 ***Standardized Emergency Management Systems***

34 The Standardized Emergency Management Systems law (Government
35 Code Section 8607) directs Cal EMA (formerly OES) to establish,
36 implement, and maintain a coordinated emergency response system. The
37 California Mutual Aid Agreement defines responsibilities and resource
38 sharing between agencies to ensure that adequate resources, facilities,
39 and other support are provided to jurisdictions when their own resources
40 are insufficient to cope with the needs of a given emergency.

1 **California Education Code**
2 The California Education Code provides educational goals and
3 requirements for the educational providers in the state (Title 5 of the
4 California Code of Regulations). It governs school district formation and
5 operation, county board of education authorities and responsibilities, and
6 educational criteria for children between 6 and 18 years of age.

7 **California Fire Plan**
8 The California Fire Plan provides guidance for reducing the risk of
9 wildfire. The following are the basic principles of the fire plan:

- 10 • Community involvement
- 11 • Community risk assessment
- 12 • Development of solutions and implementation of projects

13 **22.2.3 Regional and Local**

14 **Shasta County General Plan**
15 The *Shasta County General Plan* (Shasta County 2004) identifies goals,
16 objectives, and policies related to public services in Shasta County. Fire
17 protection and law enforcement services are discussed in the section
18 titled “Fire Safety and Sheriff Protection.” Schools are discussed in the
19 section titled “Public Facilities.”

20 **Tehama County General Plan Update 2009–2029**
21 The *Tehama County General Plan Update 2009–2029* (Tehama County
22 2009) identifies goals, objectives, and policies for public services in
23 Tehama County. The public services element of the general plan
24 addresses concerns associated with growth and development as they
25 relate to public services, including schools. The safety element addresses
26 potential dangers and damages associated with fire, floods, earthquakes,
27 landslides, and other hazards.

28 **22.3 Environmental Consequences and Mitigation Measures**

29 **22.3.1 Methods and Assumptions**

30 This section addresses potential impacts associated with implementation
31 of the project on the following public services: law enforcement, fire
32 protection, emergency services, and schools. The analysis is based on a
33 review of planning documents applicable to the project area,
34 consultation with various agencies, and field reconnaissance.

35 **22.3.2 Criteria for Determining Significance of Effects**

36 An environmental document prepared to comply with the NEPA must
37 consider the context and intensity of the environmental effects that

1 would be caused by, or result from, the proposed action. Under NEPA,
2 the significance of an effect is used solely to determine whether an EIS
3 must be prepared. An environmental document prepared to comply with
4 the CEQA must identify the potentially significant environmental effects
5 of a project. A “[s]ignificant effect on the environment” means a
6 substantial, or potentially substantial, adverse change in any of the
7 physical conditions within the area affected by the project” (State CEQA
8 Guidelines, Section 15382). CEQA also requires that the environmental
9 document propose feasible measures to avoid or substantially reduce
10 significant environmental effects (State CEQA Guidelines, Section
11 15126.4(a)).

12 The following significance criteria are based on guidance provided by
13 the State CEQA Guidelines and consider the context and intensity of the
14 environmental effects as required under NEPA. Impacts of an alternative
15 on public services would be significant if project implementation would
16 do any of the following:

- 17 • Interfere with emergency services
- 18 • Degrade the level of service of a public service
- 19 • Require relocating public service facilities
- 20 • Require substantial improvements to the facilities or level of
21 staffing of a public service to maintain its existing level of
22 service

23 **22.3.3 Topics Eliminated from Further Consideration**

24 No topics were eliminated from consideration.

25 **22.3.4 Direct and Indirect Effects**

26 ***No-Action Alternative***

27 The impact discussion for the No-Action Alternative addresses Shasta
28 Lake and vicinity and the upper Sacramento River together because this
29 alternative would not affect land use in any of the primary study area
30 locations. It also addresses the lower Sacramento River and Delta and
31 the CVP/SWP service areas together because the distance from the
32 project area would result in similar impacts.

33 **Shasta Lake and Vicinity, Upper Sacramento River (Shasta Dam to 34 Red Bluff), Lower Sacramento River and Delta, and CVP/SWP 35 Service Areas**

36 *Impact PS-1 (No-Action): Disruption of Public Services* Under the No-
37 Action Alternative, no new facilities would be constructed in the
38 primary or extended study areas, and no changes in Reclamation’s

1 existing facilities or operations would occur that would directly or
2 indirectly result in the disruption of public services in the project area.
3 Therefore, no impact would occur. Mitigation is not required for the No-
4 Action Alternative.

5 *Impact PS-2 (No-Action): Degraded Level of Public Services* Under the
6 No-Action Alternative, no new facilities or infrastructure would be
7 constructed in the primary or extended study areas and no changes in
8 Reclamation's existing facilities or operations would occur that would
9 directly or indirectly result in degraded levels of public services in the
10 project area. Therefore, no impact would occur. Mitigation is not
11 required for the No-Action Alternative.

12 *Impact PS-3 (No-Action): Relocation of Public Service Facilities*
13 Under the No-Action Alternative, no new facilities would be constructed
14 in the primary or extended study areas and no changes in Reclamation's
15 existing facilities or operations would occur that would directly or
16 indirectly result in the relocation of public service facilities in the project
17 area. Therefore, no impact would occur. Mitigation is not required for
18 the No-Action Alternative.

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

21 The impact discussion for CP1 addresses Shasta Lake and vicinity and
22 upper Sacramento River together because impacts from construction
23 activities would affect both areas. It also addresses the lower
24 Sacramento River and Delta and the CVP/SWP service areas together
25 because their distance from the project area would result in similar
26 impacts.

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

29 *Impact PS-1 (CP1): Short-Term Disruption of Public Services* Project
30 construction could result in short-term disruption of emergency services
31 response as well as short-term disruption to school bus services
32 throughout the Gateway Unified School District. Short-term traffic
33 delays and access restrictions would require traffic controls and
34 coordination with public services agencies. Although Reclamation
35 would implement measures to lessen short-term disruption of public
36 services, this impact would be potentially significant.

37 Construction activities associated with enlarging Shasta Dam and related
38 infrastructure (e.g., road relocations, bridge replacements) near the dam
39 and near relocation sites for utilities, roads, and structures could
40 temporarily disrupt transportation and circulation patterns in the vicinity,
41 which could affect emergency services response and school bus service.
42 Emergency preparedness, emergency communications, and emergency

1 supplies, including food and shelter for emergency crews and public
2 services staff, could also be affected by project implementation because
3 of temporary increases in the work force.

4 Direct impacts could include disruption of traffic flows and street
5 operations through temporary lane closures, detours, blockages, and
6 restrictions on curbside parking; these impacts could result in delays for
7 emergency services vehicles and school buses traveling through or
8 around construction zones. In addition, project construction could cause
9 short-term interruptions in power and telecommunications services,
10 which could affect emergency response capabilities in the primary study
11 area.

12 Construction activities that could disrupt emergency services and school
13 bus service in the primary study area include road and bridge
14 replacement, telecommunications facility replacement, power facility
15 replacement, vegetation clearing for utility relocation, structure removal,
16 marina relocation, and emergency services facility relocation.
17 Reclamation estimates that construction activities for CP1 would take
18 4.5 years.

19 Routes proposed for transporting construction materials to the dam
20 consist of I-5 and local roads, particularly Shasta Dam Boulevard and
21 Lake Boulevard. These routes are used primarily by Reclamation
22 personnel to access the Shasta Dam facilities, by visitors and tourists,
23 and by residents of the city of Shasta Lake. At this time, no detours or
24 lane closures are proposed for the portions of Shasta Dam Boulevard
25 and Lake Boulevard that serve the city of Shasta Lake. Road closures
26 would likely be required adjacent to the facilities in the immediate
27 vicinity of Shasta Dam and Reclamation's Northern California Area
28 Office.

29 The Gateway Unified School District covers Shasta Lake and vicinity
30 and portions of the upper Sacramento River area. Project construction
31 could result in traffic delays and the need to reroute local traffic to
32 ensure public health and safety. School bus routes could be temporarily
33 affected by road closures and detours during project construction in
34 communities around Shasta Lake.

35 Several roads around Shasta Lake would be affected by infrastructure,
36 utility, and marina relocation activities. These activities could require
37 road closures, detours, or traffic restrictions.

38 Emergency supplies and resources that could be affected by project
39 implementation include food, shelter for emergency crews and local
40 residents, and public services staff and equipment. Project construction
41 activities are located within commuting distance of Redding, where

1 ample food and shelter are available in emergencies. The Cal EMA
2 network could supplement local emergency services staffing and
3 equipment levels. However, Cal EMA may not be able to provide
4 assistance when wildfires in the state require Cal EMA resources.

5 Construction activities at Shasta Dam and various locations surrounding
6 Shasta Lake could affect emergency response capabilities throughout
7 Shasta County (i.e., in a portion of the upper Sacramento River area)
8 because the areas share emergency services resources and
9 responsibilities.

10 In summary, project construction could result in short-term disruption of
11 school bus services throughout the Gateway Unified School District.
12 Short-term traffic delays and access restrictions would require traffic
13 controls and coordination with public services agencies. Therefore, this
14 impact would be potentially significant. Mitigation for this impact is
15 proposed in Section 22.3.5.

16 *Impact PS-2 (CPI): Degraded Level of Public Services* Project
17 implementation could temporarily degrade local public resources.
18 Although Reclamation would provide affected public services providers
19 (e.g., law enforcement, fire protection, emergency services) with
20 sufficient funding and support to ensure that levels of public services
21 would not be substantially degraded by construction activities, this
22 impact would be potentially significant.

23 Project implementation could result in short-term degradation of levels
24 of public services, including law enforcement, fire protection, and
25 emergency services. This conclusion is based on the size of the project
26 and proposed locations for construction activity associated with
27 infrastructure alterations. The relocation of infrastructure combined with
28 possible consolidation of recreational facilities (e.g., USFS
29 administrative facilities, campgrounds, boat ramps, marinas) could result
30 in changing demands for public services. Project construction activities
31 proposed around Shasta Lake could require local, State, and Federal
32 agencies to change the locations of some public services, which could
33 affect the areas where the public services are currently located.

34 Project implementation could also result in degraded levels of public
35 services in the upper Sacramento River portion of the primary study area
36 because the Shasta Lake area and parts of the upper Sacramento River
37 area share public services. Project construction activities at Shasta Lake
38 could require the use of public services resources that could be needed
39 simultaneously for public services assistance in the upper Sacramento
40 River area.

1 Reclamation estimates that CP1 would take 4.5 years to complete.
2 Public services levels that are increased as a result of the project would
3 return to pre-project levels once construction activities were completed.
4 However, project implementation could temporarily degrade local public
5 resources. This impact would be potentially significant. Mitigation for
6 this impact is proposed in Section 22.3.5.

7 *Impact PS-3 (CP1): Relocation of Public Services* The project would
8 require relocation of some public service facilities in the Shasta Lake
9 and vicinity portion of the primary study area. No public services
10 facilities in the upper Sacramento River portion of the primary study
11 area would need to be relocated. This impact would be less than
12 significant.

13 The Whiskeytown-Shasta-Trinity National Recreation Area is managed
14 by USFS, which has several facilities throughout the reservoir area. Two
15 USFS facilities would be inundated and thus would require relocation or
16 replacement. The work station located in the Lakeshore area would be
17 inundated by raising Shasta Dam and would have to be relocated to an
18 area above the new full pool. The new facility would contain all of the
19 features that exist at the current facility. The inundated facility would be
20 demolished and hauled to waste. At Turntable Bay, another USFS
21 facility would be inundated by the raising of Shasta Dam. Additional
22 space at Turntable Bay would allow for the facility to be relocated on fill
23 in the current location. Also, the SCSO substation and dock at the
24 Bridge Bay Marina could need to be relocated within the marina
25 complex. Reclamation would construct the replacement facilities before
26 abandonment and demolition of the existing facilities, thereby ensuring
27 that levels of public services provided by these facilities would not be
28 adversely affected by the relocation process. This impact would be less
29 than significant. Mitigation for this impact is not needed, and thus not
30 proposed.

31 **Lower Sacramento River and Delta and CVP/SWP Service Areas**
32 *Impact PS-4 (CP1): Short-Term Disruption of Public Services* Project
33 implementation would not disrupt public services in the extended study
34 area because of the distance of the extended study area from project
35 elements that could affect public services. The northern end of the
36 extended study area would be more than 30 miles from the nearest
37 project construction activities. Emergency services providers with
38 mutual aid agreements that could be called on to assist with emergencies
39 resulting from project activities are located in the primary study area.
40 Project construction activities in the primary study area that could
41 disrupt public services would be too far removed from the extended
42 study area to disrupt emergency services or law enforcement serving
43 areas south of Red Bluff. Project implementation would not disrupt
44 school bus service in the extended study area because school districts

1 located in the extended study area would not operate school bus routes
2 in or near project construction activities. Therefore, no impact would
3 occur. Mitigation for this impact is not needed, and thus not proposed.

4 *Impact PS-5 (CPI): Degraded Levels of Public Services* Construction
5 activities are not expected to affect public service levels in the extended
6 study area. Existing facilities, personnel, and equipment in the extended
7 study area could provide short-term assistance for project-related public
8 services needs without degrading public services levels in the extended
9 study area. This impact would be less than significant.

10 The northern end of the extended study area would be more than 30
11 miles from the nearest project construction activities. Public services
12 providers with mutual aid agreements that could be called on to assist
13 with law enforcement, fire suppression, or other emergencies resulting
14 from project activities are located in the primary study area. Project
15 construction activities around Shasta Lake are too far removed from the
16 extended study area to disrupt public services below Red Bluff. Public
17 services providers located in the extended study area could be called on
18 by Cal EMA to assist with large-scale emergencies in the primary study
19 area that resulted from project implementation. However, existing
20 facilities, personnel, and equipment in the extended study area would be
21 adequate to maintain current levels of service while providing assistance
22 to the primary study area.

23 Indirect impacts on public services in the extended study area could
24 result from traffic accidents associated with the transport of project
25 materials and workers. Some project materials and workers could
26 originate in the extended study area, requiring northbound travel to the
27 primary study area. At this time, Reclamation estimates that the project
28 would employ 350 workers. Project-related travel that would likely
29 occur on I-5, the railway, or via air transport is not anticipated to result
30 in accidents in the extended study area that would require significant
31 response from law enforcement, fire protection, or emergency services
32 providers; however, the fact that traffic accidents resulting from project-
33 related travel could occur in the extended study area means that the
34 possibility of travel-related accidents would exist. Existing facilities,
35 personnel, and equipment in the extended study area are expected be
36 adequate to maintain current levels of service while providing assistance
37 for any such accidents.

38 Existing facilities, staff, and equipment in the extended study area would
39 be capable of providing short-term assistance for project-related public
40 services needs without degrading levels of public services in the
41 extended study area. Therefore, this impact would be less than
42 significant. Mitigation for this impact is not needed, and thus not
43 proposed.

1 *Impact PS-6 (CP1): Relocation of Public Services Facilities* Project
2 implementation would not result in the relocation of public services
3 facilities in the extended study area. Therefore, public services in the
4 extended study area would not be affected by relocation of public
5 services facilities. No impact would occur. Mitigation for this impact is
6 not needed, and thus not proposed.

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

9 The impact discussion for CP2 addresses Shasta Lake and vicinity and
10 the upper Sacramento River together because impacts from construction
11 activities would affect both areas. It also addresses the lower
12 Sacramento River and Delta and the CVP/SWP service areas together
13 because their distance from the project area would result in similar
14 impacts.

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

17 *Impact PS-1 (CP2): Short-Term Disruption of Public Services* Project
18 construction could temporarily disrupt transportation and circulation
19 patterns, which could affect emergency services response and school bus
20 service. Although Reclamation would provide affected public services
21 providers (e.g., law enforcement, fire protection, emergency services)
22 with sufficient funding and support to ensure that levels of public
23 services were not substantially degraded by construction activities, this
24 impact would be potentially significant.

25 Construction activities associated with enlarging Shasta Dam and related
26 infrastructure (e.g., road relocations, bridge replacements) near the dam
27 and near the relocation sites for utilities, roads, and structures could
28 temporarily disrupt transportation and circulation patterns in the vicinity
29 of Shasta Lake, which could affect emergency services response and
30 school bus service. Emergency preparedness, emergency
31 communications, and emergency supplies (e.g., food, shelter for
32 emergency crews, public services staff) could also be affected by project
33 implementation.

34 Impacts related to short-term disruption of emergency services that
35 would result from implementing the 12.5-foot dam raise (CP2) are
36 similar to those identified for the 6.5-foot dam raise (Impact PS-1
37 (CP1)). However, the duration of the impacts would be longer for CP2
38 because construction activities associated with the 12.5-foot dam raise
39 would take more time than under the 6.5-foot dam raise. The 12.5-foot
40 dam raise would require significantly more concrete and is anticipated to
41 take 6 more months to construct than the 6.5-foot dam raise (CP1).

1 The increased amount of infrastructure demolition and relocation
2 activity associated with CP2 would also require more time than under
3 CP1. More structures would need to be demolished and relocated, and
4 additional power and telecommunication lines would need to be
5 relocated. Additional septic systems and wells would also require
6 demolition and relocation, and 20 additional road segments would need
7 to be realigned for CP2. The increased construction activity in the Shasta
8 Lake and vicinity portion of the primary study area under CP2 would
9 extend the duration of potential disruption to emergency services and
10 school bus service in that area. This impact would be potentially
11 significant. Mitigation for this impact is proposed in Section 22.3.5.

12 *Impact PS-2 (CP2): Degraded Levels of Public Services* Project
13 implementation could cause short-term degradation of levels of public
14 services, including law enforcement, fire protection, and emergency
15 services. Although Reclamation would provide affected public services
16 providers (e.g., law enforcement, fire protection, emergency services)
17 with sufficient funding and support to ensure that levels of public
18 services would not be substantially degraded, this impact would be
19 potentially significant.

20 Project implementation could result in short-term degradation of levels
21 of public services, including law enforcement, fire protection, and
22 emergency services. This conclusion is based on the size of the project
23 and proposed locations for construction activity associated with
24 infrastructure alterations. The relocation of infrastructure combined with
25 possible consolidation of recreational facilities (e.g., campgrounds, boat
26 ramps, marinas) could result in changing demands for public services.
27 Project construction activities proposed around Shasta Lake could
28 require local, State, and Federal agencies to change the locations of
29 some public services, which could affect the areas where the resources
30 are currently located.

31 This impact would be similar to Impact PS-2 (CP1). However, the
32 impacts would last longer for CP2 than CP1 because more time would
33 be needed to complete project construction under the 12.5-foot dam
34 raise. Reclamation estimates that CP2 would take 5 years to complete.
35 Project implementation could temporarily degrade local public services.
36 This impact would be potentially significant. Mitigation for this impact
37 is proposed in Section 22.3.5.

38 *Impact PS-3 (CP2): Relocation of Public Services Facilities* This
39 impact would be similar to Impact PS-3 (CP1). Facility relocation would
40 not degrade levels of public services when the public service agencies
41 relocated to their new facilities. This impact would be less than
42 significant. Mitigation for this impact is not needed, and thus not
43 proposed.

1 **Lower Sacramento River and Delta and CVP/SWP Service Areas**
2 *Impact PS-4 (CP2): Short-Term Disruption of Public Services* This
3 impact would be similar to Impact PS-4 (CP1). Project implementation
4 would not disrupt public services in the extended study area because of
5 the distance of the extended study area from project elements that could
6 affect public services. No impact would occur. Mitigation for this impact
7 is not needed, and thus not proposed.

8 *Impact PS-5 (CP2): Degraded Levels of Public Services* This impact
9 would be similar to Impact PS-5 (CP1). Project construction activities
10 are not expected to affect public services levels in the extended study
11 area. Existing facilities, staff, and equipment in the extended study area
12 would be capable of providing short-term assistance for project-related
13 public services needs without degrading levels of public services in the
14 extended study area. This impact would be less than significant.
15 Mitigation for this impact is not needed, and thus not proposed.

16 *Impact PS-6 (CP2): Relocation of Public Services Facilities* This
17 impact would be identical to Impact PS-6 (CP1). Project implementation
18 would not result in the relocation of public service facilities in the
19 extended study area. No impact would occur. Mitigation for this impact
20 is not needed, and thus not proposed.

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

23 The impact discussion for CP3 addresses Shasta Lake and vicinity and
24 the upper Sacramento River together because impacts from construction
25 activities would affect both areas. It also addresses the lower
26 Sacramento River and Delta and the CVP/SWP service areas together
27 because their distance from the project area would result in similar
28 impacts.

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

31 *Impact PS-1 (CP3): Short-Term Disruption of Public Services* Project
32 construction could temporarily disrupt transportation and circulation
33 patterns, which could affect emergency services response and school bus
34 service. Although Reclamation would provide affected public services
35 providers (e.g., law enforcement, fire protection, emergency services)
36 with sufficient funding and support to ensure that levels of public
37 services were not substantially degraded by construction activities, this
38 impact would be potentially significant.

39 Construction activities associated with enlarging Shasta Dam and the
40 related infrastructure (e.g., road relocations, bridge replacements) near
41 the dam and near the relocation sites for utilities, roads, and structures
42 could temporarily disrupt transportation and circulation patterns in the

1 vicinity, which could affect emergency services response and school bus
2 service. Emergency preparedness, emergency communications, and
3 emergency supplies (food, shelter for emergency crews, public services
4 staff) could also be affected by project implementation.

5 This impact would be similar to Impact PS-1 (CP1). However, the
6 impact would last longer for CP3 because construction activities
7 associated with the 18.5-foot dam raise would take more time than for
8 the 6.5-foot dam raise. Reclamation estimates that the 18.5-foot dam
9 raise would take 5 years. The 18.5-foot dam raise would require
10 significantly more concrete and is anticipated to take 6 more months to
11 construct than the 6.5-foot dam raise (CP1). The increased amount of
12 infrastructure demolition and relocation activity associated with CP3
13 would also require more time than for CP1. Almost twice as many
14 structures would need to be demolished and relocated, and additional
15 power and telecommunication lines would require removal and
16 relocation. Additional septic systems and wells would be abandoned and
17 relocated, and 25 more road segments would be realigned. The increased
18 construction activity at Shasta Dam and in the surrounding area would
19 extend the time of potential disruption to emergency services. This
20 impact would be potentially significant. Mitigation for this impact is
21 proposed in Section 22.3.5.

22 *Impact PS-2 (CP3): Degraded Levels of Public Services* Project
23 implementation could cause short-term degradation of levels of public
24 services, including law enforcement, fire protection, and emergency
25 services. Although Reclamation would provide affected public services
26 providers (e.g., law enforcement, fire protection, emergency services)
27 with sufficient funding and support to ensure that levels of public
28 services were not substantially degraded, this impact would be
29 potentially significant.

30 Project implementation could result in short-term degradation of levels
31 of public services, including law enforcement, fire protection, and
32 emergency services. This conclusion is based on the size of the project
33 and proposed locations for construction activity associated with
34 infrastructure alterations. The relocation of infrastructure, combined
35 with possible consolidation of recreational facilities (e.g., campgrounds,
36 boat ramps, marinas), could result in changing demands for public
37 services. Project construction activities proposed around Shasta Lake
38 could require local, State, and Federal agencies to change the locations
39 of some public services, which could affect the areas where the public
40 services are currently located.

41 This impact would be similar to Impact PS-2 (CP1). However, the
42 impact would last longer for CP3 than for CP1 because more time would
43 be needed to complete project construction for the 18.5-foot dam raise.

1 This impact would be potentially significant. Mitigation for this impact
2 is proposed in Section 22.3.5.

3 *Impact PS-3 (CP3): Relocation of Public Services Facilities* This
4 impact would be similar to Impact PS-3 (CP1). Facilities relocation
5 would not degrade levels of public services while the public services
6 agencies are relocating to new facilities. This impact would be less than
7 significant. Mitigation for this impact is not needed, and thus not
8 proposed.

9 **Lower Sacramento River and Delta and CVP/SWP Service Areas**
10 *Impact PS-4 (CP3): Short-Term Disruption of Public Services* This
11 impact would be similar to Impact PS-4 (CP1). Project implementation
12 would not disrupt public services in the extended study area because of
13 the distance of the extended study area from project elements that could
14 affect public services. No impact would occur. Mitigation for this impact
15 is not needed, and thus not proposed.

16 *Impact PS-5 (CP3): Degraded Levels of Public Services* This impact
17 would be similar to Impact PS-5 (CP1). Project construction activities
18 are not expected to affect public services levels in the extended study
19 area. Existing facilities, staff, and equipment in the extended study area
20 would be capable of providing short-term assistance for project-related
21 public services needs without degrading levels of public services in the
22 extended study area. This impact would be less than significant.
23 Mitigation for this impact is not needed, and thus not proposed.

24 *Impact PS-6 (CP3): Relocation of Public Services Facilities* This
25 impact would be identical to Impact PS-6 (CP1). Project implementation
26 would not result in the relocation of public services facilities in extended
27 study area. No impact would occur. Mitigation for this impact is not
28 needed, and thus not proposed.

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

31 The impact discussion for CP4 addresses Shasta Lake and vicinity and
32 the upper Sacramento River together because impacts from construction
33 activities would affect both areas. It also addresses the lower
34 Sacramento River and Delta and the CVP/SWP service areas together
35 because their distance from the project area would result in similar
36 impacts.

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

39 *Impact PS-1 (CP4): Short-Term Disruption of Public Services* Project
40 construction could temporarily disrupt transportation and circulation
41 patterns, which could affect emergency services response and school bus

1 service. Although Reclamation would provide affected public services
2 providers (e.g., law enforcement, fire protection, emergency services)
3 with sufficient funding and support to ensure that levels of public
4 services were not substantially degraded by construction activities, this
5 impact would be potentially significant.

6 This impact would be similar to Impact PS-1 (CP3). Construction
7 activities associated with enlarging Shasta Dam and related
8 infrastructure (e.g., road relocations, bridge replacements) near the dam
9 and near the relocation sites for utilities, roads, and structures could
10 temporarily disrupt transportation and circulation patterns in the vicinity
11 of Shasta Lake, which could affect emergency services response and
12 school bus service. Emergency preparedness, emergency
13 communications, and emergency supplies (e.g., food, shelter for
14 emergency crews, public services staff) could also be affected by project
15 implementation. In addition, gravel augmentation and the habitat
16 restoration activities along the upper Sacramento River would slightly,
17 but not substantially, increase the potential for short-term disruption of
18 public services in the primary study area. This impact would be
19 potentially significant. Mitigation for this impact is proposed in Section
20 22.3.5.

21 *Impact PS-2 (CP4): Degraded Levels of Public Services* Project
22 implementation could cause short-term degradation of levels of public
23 services, including law enforcement, fire protection, and emergency
24 services. Although Reclamation would provide affected public services
25 providers (e.g., law enforcement, fire protection, emergency services)
26 with sufficient funding and support to ensure that levels of public
27 services were not substantially degraded, this impact would be
28 potentially significant.

29 This impact would be similar to Impact PS-2 (CP3). Project
30 implementation could result in short-term degradation of levels of public
31 services, including law enforcement, fire protection, and emergency
32 services. This conclusion is based on the size of the project and
33 proposed locations for construction activity associated with
34 infrastructure alterations. The relocation of infrastructure, combined
35 with possible consolidation of recreational facilities (e.g., campgrounds,
36 boat ramps, marinas), could result in changing demands for public
37 services. Project construction proposed around Shasta Lake could
38 require local, State, and Federal agencies to change the location of some
39 public services, which could affect the areas where the public services
40 are currently located. In addition, gravel augmentation and the habitat
41 restoration activities along the upper Sacramento River would slightly,
42 but not substantially, increase the potential for degradation of public
43 services. This impact would be potentially significant. Mitigation for
44 this impact is proposed in Section 22.3.5.

1 *Impact PS-3 (CP4): Relocation of Public Services Facilities* This
2 impact would be similar to Impact PS-3 (CP1). Facilities relocation
3 would not degrade levels of public services while the public services
4 agencies are relocating to new facilities. This impact would be less than
5 significant. Mitigation for this impact is not needed, and thus not
6 proposed.

7 **Lower Sacramento River and Delta and CVP/SWP Service Areas**
8 *Impact PS-4 (CP4): Short-Term Disruption of Public Services* This
9 impact would be similar to Impact PS-4 (CP1). Project implementation
10 would not disrupt public services in the extended study area because of
11 the distance of the extended study area from project elements that could
12 affect public services. fore no impact would occur. Mitigation for this
13 impact is not needed, and thus not proposed.

14 *Impact PS-5 (CP4): Degraded Levels of Public Services* This impact
15 would be similar to Impact PS-5 (CP1). Project construction activities
16 are not expected to affect public services levels in the extended study
17 area. Existing facilities, staff, and equipment in the extended study area
18 would be capable of providing short-term assistance for project-related
19 public services needs without degrading levels of public services in the
20 extended study area. This impact would be less than significant.
21 Mitigation for this impact is not needed, and thus not proposed.

22 *Impact PS-6 (CP4): Relocation of Public Services Facilities* This
23 impact would be identical to Impact PS-6 (CP1). Project implementation
24 would not result in the relocation of public services facilities in the
25 extended study area. No impact would occur. Mitigation for this impact
26 is not needed, and thus not proposed.

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

28 The impact discussion for CP5 addresses Shasta Lake and vicinity and
29 the upper Sacramento River together because impacts from construction
30 activities would affect both areas. It also addresses the lower
31 Sacramento River and Delta and the CVP/SWP service areas together
32 because their distance from the project area would result in similar
33 impacts.

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

36 *Impact PS-1 (CP5): Short-Term Disruption of Public Services* Project
37 construction could temporarily disrupt transportation and circulation
38 patterns, which could affect emergency services response and school bus
39 service. Although Reclamation would provide affected public services
40 providers (e.g., law enforcement, fire protection, emergency services)
41 with sufficient funding and support to ensure that levels of public

1 services were not substantially degraded by construction activities, this
2 impact would be potentially significant.

3 This impact would be similar to Impact PS-1 (CP3). Construction
4 activities associated with enlarging Shasta Dam and related
5 infrastructure (e.g., road relocations, bridge replacements) near the dam
6 and near relocation sites for utilities, roads, and structures could
7 temporarily disrupt transportation and circulation patterns in the vicinity,
8 which could affect emergency services response and school bus service.
9 Emergency preparedness, emergency communications, and emergency
10 supplies (e.g., food, shelter for emergency crews, public service staff)
11 could also be affected by project implementation. In addition, gravel
12 augmentation and the habitat restoration activities along the upper
13 Sacramento River would slightly, but not substantially, increase the
14 potential for short-term disruption of public services in the primary
15 study area. This impact would be potentially significant. Mitigation for
16 this impact is proposed in Section 22.3.5.

17 *Impact PS-2 (CP5): Degraded Levels of Public Services* Project
18 implementation could cause short-term degradation of levels of public
19 services, including law enforcement, fire protection, and emergency
20 services. Although Reclamation would provide affected public services
21 providers (e.g., law enforcement, fire protection, emergency services)
22 with sufficient funding and support to ensure that levels of public
23 services were not substantially degraded, this impact would be
24 potentially significant.

25 This impact would be similar to Impact PS-2 (CP3). Project
26 implementation could result in short-term degradation of levels of public
27 services, including impacts on law enforcement, fire protection, and
28 emergency services. This conclusion is based on the size of the project
29 and proposed locations for construction activity associated with
30 infrastructure alterations. Project construction activities proposed around
31 Shasta Lake could require local, State, and Federal agencies to change
32 the location of some public services, which could affect the areas where
33 the public services are currently located. In addition, gravel
34 augmentation and the habitat restoration activities along the upper
35 Sacramento River would slightly, but not substantially, increase the
36 potential for degradation of public services. This impact would be
37 potentially significant. Mitigation for this impact is proposed in Section
38 22.3.5.

39 *Impact PS-3 (CP5): Relocation of Public Services Facilities* This
40 impact is similar to Impact PS-3 (CP1). Facilities relocation would not
41 degrade levels of public service while the public service agencies are
42 relocating to new facilities. This impact would be less than significant.
43 Mitigation for this impact is not needed, and thus not proposed.

Lower Sacramento River and Delta and CVP/SWP Service Areas
Impact PS-4 (CP5): Short-Term Disruption of Public Services This impact would be similar to Impact PS-4 (CP1). Project implementation would not disrupt public services in the extended study area because of the distance of the extended study area from project elements that could affect public services. No impact would occur. Mitigation for this impact is not needed, and thus not proposed.

Impact PS-5 (CP5): Degraded Levels of Public Services This impact would be similar to Impact PS-5 (CP1). Project construction activities are not expected to affect public services levels in the extended study area. Existing facilities, staff, and equipment in the extended study area would be capable of providing short-term assistance for project-related public services needs without degrading levels of public services in the extended study area. This impact would be less than significant. Mitigation for this impact is not needed, and thus not proposed.

Impact PS-6 (CP5): Relocation of Public Services Facilities This impact would be identical to Impact PS-6 (CP1). Project implementation would not result in the relocation of public services facilities in the extended study area. No impact would occur. Mitigation for this impact is not needed, and thus not proposed.

22.3.5 Mitigation Measures

Table 22-2 presents a summary of mitigation measures for public services.

Table 22-2. Summary of Mitigation Measures for Public Services

Impact		No-Action Alternative	CP1	CP2	CP3	CP4	CP5
Impact PS-1: Disruption of Public Services (Shasta Lake and Vicinity and Upper Sacramento River)	LOS before Mitigation	NI	PS	PS	PS	PS	PS
	Mitigation Measure	None required.	PS-1: Coordinate and Assist Public Services Agencies.				
	LOS after Mitigation	NI	LTS	LTS	LTS	LTS	LTS
Impact PS-2: Degraded Level of Public Services (Shasta Lake and Vicinity and Upper Sacramento River)	LOS before Mitigation	NI	PS	PS	PS	PS	PS
	Mitigation Measure	None required.	PS-2: Provide Support to Public Services Agencies.				
	LOS after Mitigation	NI	LTS	LTS	LTS	LTS	LTS
Impact PS-3: Relocation of Public Service Facilities (Shasta Lake and Vicinity and Upper Sacramento River)	LOS before Mitigation	NI	LTS	LTS	LTS	LTS	LTS
	Mitigation Measure	None required.	None needed; thus, none proposed.				
	LOS after Mitigation	NI	LTS	LTS	LTS	LTS	LTS

1 **Table 22-2. Summary of Mitigation Measures for Public Services (contd.)**

Impact		No-Action Alternative	CP1	CP2	CP3	CP4	CP5
Impact PS-4: Short-Term Disruption of Public Services (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 PS-5: Degraded Levels of Public Services (Lower Sacramento River, Delta, CVP/SWP Service Areas)	LOS before Mitigation	NI	LTS	LTS	LTS	LTS	LTS
	Mitigation Measure	None required.	None needed; thus, none proposed.				
	LOS after Mitigation	NI	LTS	LTS	LTS	LTS	LTS
Impact PS-6: Relocation of Public Services Facilities (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

2

3 **No-Action Alternative**

4 No mitigation measures are required for the No-Action Alternative.

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

7 No mitigation is required for Impacts PS-3 (CP1) through PS-6 (CP1).
8 Mitigation is provided below for impacts of CP1 related to short-term
9 disruption of public services (PS-1) and degraded levels of public
10 services in the primary study area (PS-2).

11 **Mitigation Measure PS-1 (CP1): Coordinate and Assist Public**
12 **Services Agencies**

13 Reclamation will coordinate all proposed road
14 closures, detours, and traffic control measures with the Shasta County
15 Sheriff’s Office and Tehama County Sheriff’s Office, which are the
16 designated Cal EMA (formerly OES) headquarters for the primary study
area.

17 Reclamation will appoint a public liaison to communicate construction
18 schedules, road closures, and project activities to the public. The liaison
19 will organize and conduct public meetings for the purpose of
20 communicating project information. The liaison will meet with all
21 affected public services agencies to coordinate public meetings and
22 information exchanges.

1 Reclamation will obtain all necessary permits and/or authorizations from
2 public services agencies for matters requiring agency approval and/or
3 cooperation.

4 Reclamation will meet with public services agencies to determine traffic
5 controls for infrastructure, utility, and structure relocation.

6 Reclamation will develop and implement a monitoring plan to track the
7 effectiveness of this mitigation measure, and will make adjustments, if
8 necessary.

9 *Traffic Control and Safety Assurance Plan* Reclamation will implement
10 Mitigation Measure Trans-1 as described in Chapter 20, “Transportation
11 and Traffic,” to reduce adverse effects of road closures and detours or
12 partial road closures on access to local streets and adjacent uses.

13 Implementation of this mitigation measure would reduce Impact PS-1
14 (CP1) to a less-than-significant level.

15 **Mitigation Measure PS-2 (CP1): Provide Support to Public Services**
16 **Agencies** Reclamation will provide affected public services providers
17 (e.g., law enforcement, fire protection, emergency services) with
18 sufficient funding and support to ensure that levels of public services are
19 not substantially degraded by construction activities. Reclamation will
20 coordinate with affected providers to develop a mutual understanding of
21 the amount and schedule of financial and administrative support
22 required to reduce this impact to a less-than-significant level.

23 Reclamation will develop and implement a monitoring plan to track the
24 effectiveness of this mitigation measure, and will make adjustments, if
25 necessary.

26 Implementation of this mitigation measure would reduce Impact PS-2
27 (CP1) to a less-than-significant level.

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

30 No mitigation is required for Impacts PS-3 (CP2) through PS-6 (CP2).
31 Mitigation is provided below for the impacts of CP2 related to short-
32 term disruption of public services (PS-1) and degraded levels of public
33 services (PS-2) in the primary study area.

34 **Mitigation Measure PS-1 (CP2): Coordinate and Assist Public**
35 **Services Agencies** This mitigation measure is identical to Mitigation
36 Measure PS-1 (CP1). Implementation of this mitigation measure would
37 reduce Impact PS-1 (CP2) to a less-than-significant level.

1 **Mitigation Measure PS-2 (CP2): Provide Support to Public Services**
2 **Agencies** This mitigation measure is identical to Mitigation Measure
3 PS-2 (CP1). Implementation of this mitigation measure would reduce
4 Impact PS-2 (CP2) to a less-than-significant level.

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

7 No mitigation is required for Impacts PS-3 (CP3) through PS-6 (CP3).
8 Mitigation is provided below for the impacts of CP3 related to short-
9 term disruption of public services (PS-1) and degraded levels of public
10 services (PS-2) in the primary study area.

11 **Mitigation Measure PS-1 (CP3): Coordinate and Assist Public**
12 **Services Agencies** This mitigation measure is identical to Mitigation
13 Measure PS-1 (CP1). Implementation of this mitigation measure would
14 reduce Impact PS-1 (CP3) to a less-than-significant level.

15 **Mitigation Measure PS-2 (CP3): Provide Support to Public Services**
16 **Agencies** This mitigation measure is identical to Mitigation Measure
17 PS-2 (CP1). Implementation of this mitigation measure would reduce
18 Impact PS-2 (CP3) to a less-than-significant level.

19 ***CP4-18.5 Foot Dam Raise, Anadromous Fish Focus with Water***
20 ***Supply Reliability***

21 No mitigation is required for Impacts PS-3 (CP4) through PS-6 (CP4).
22 Mitigation is provided below for the impacts of CP4 related to short-
23 term disruption of public services (PS-1) and degraded levels of public
24 services (PS-2) in the primary study area.

25 **Mitigation Measure PS-1 (CP4): Coordinate and Assist Public**
26 **Services Agencies** This mitigation measure identical to Mitigation
27 Measure PS-1 (CP1). Implementation of this mitigation measure would
28 reduce Impact PS-1 (CP4) to a less-than-significant level.

29 **Mitigation Measure PS-2 (CP4): Provide Support to Public Services**
30 **Agencies** This mitigation measure is identical to Mitigation Measure
31 PS-2 (CP1). Implementation of this mitigation measure would reduce
32 Impact PS-2 (CP4) to a less-than-significant level.

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

34 No mitigation is required for Impacts PS-3 (CP5) through PS-6 (CP5).
35 Mitigation is provided below for the impacts of CP5 related to short-
36 term disruption of public services (PS-1) and degraded levels of public
37 services (PS-2) in the primary study area.

38 **Mitigation Measure PS-1(CP5): Coordinate and Assist Public**
39 **Services Agencies** This mitigation measure is identical to Mitigation

1 Measure PS-1 (CP1). Implementation of this mitigation measure would
2 reduce Impact PS-1 (CP5) to a less-than-significant level.

3 **Mitigation Measure PS-2 (CP5): Provide Support to Public Services**
4 **Agencies** This mitigation measure is identical to Mitigation Measure
5 PS-2 (CP1). Implementation of this mitigation measure would reduce
6 Impact PS-2 (CP5) to a less-than-significant level.

7 **22.3.6 Cumulative Effects**

8 Implementing the proposed SLWRI alternatives would not have a
9 significant cumulative effect on public services in the primary study
10 area. As described above, CP1– CP5 would result in short-term
11 disruption of public services, would degrade the levels of public services
12 provided, and would require the relocation of public services facilities in
13 the primary study area. These effects would be of greater magnitude and
14 duration with the larger dam raises. Thus, effects of CP2 would be
15 similar to but greater than those of CP1, and similar to but less than
16 those of CP3–CP5. Although Mitigation Measures PS-1 and PS-2 would
17 enhance the coordination of public services during project
18 implementation, the adverse effects of CP1–CP5 would not be
19 eliminated, particularly regarding short-term disruption of public
20 services. Only two of the present or reasonably foreseeable future
21 actions, Antlers Bridge Replacement and the Iron Mountain Restoration
22 Plan, are located in the immediate vicinity of Shasta Lake and would
23 have the potential to result in short-term disruption of public services,
24 would degrade the levels of public services provided, or would require
25 the relocation of public services facilities in the primary study area. The
26 Antlers Bridge replacement is currently under construction and is
27 expected to be completed in 2015, before any of the action alternatives
28 would begin. With respect to the Iron Mountain Mine Restoration Plan,
29 this activity would be unlikely to occur simultaneously with the action
30 alternatives. Therefore, construction activities related to implementation
31 of the proposed SLWRI alternatives would not contribute considerably
32 to significant cumulative impacts on public services.

33 The effects of CP1–CP5 on public services would diminish with
34 distance from project construction sites, and the alternatives would not
35 have cumulatively considerable impacts on public services downstream
36 from Red Bluff (i.e., in the extended study area).

37

Chapter 23

Power and Energy

This chapter describes the environmental and regulatory settings of power and energy, as well as environmental consequences and mitigation measures, as they pertain to the SLWRI action alternatives. The discussion of power and energy existing conditions and the potential impacts of the program alternatives on power and energy encompass the Pit 7 Powerplant upstream from Shasta Reservoir as well as the CVP/SWP water service areas and associated facilities.

23.1 Affected Environment

Shasta Lake is an integral part of the CVP, and the proposed changes in storage and releases affect system operations throughout the CVP. This change in CVP operations and the dedication of a portion of the storage in Shasta Lake to operate for the SWP affect the operations of the entire SWP system. Locally, the potential changes in operations could affect the upstream Pit 7 Powerplant.

The CVP is a multipurpose project with 20 storage facilities, 5 pumping plants, 11 hydroelectric powerplants, and 500 miles of major canals, as well as conduits, tunnels, and related facilities. Because the CVP generates more power than it uses, the excess power is marketed through the Western Power Authority (Authority).

The SWP is a multipurpose project with 32 storage facilities. Major SWP facilities include 17 pumping plants, 8 hydroelectric powerplants, and 660-plus miles of aqueducts and pipelines. Because the SWP uses more energy than it generates from its hydroelectric facilities, DWR has exchange agreements with other utility companies and has developed other power resources. DWR sells surplus power, when it is available, to minimize the net cost of pumping energy.

For a more in-depth description of the affected environment, see the *Power and Energy Technical Report*.

23.1.1 Shasta Lake and Vicinity

The Shasta Division of the CVP contains Shasta Dam, Lake, and Powerplant, and Keswick Dam, Reservoir, and Powerplant; it captures water from the Sacramento River basin. Shasta Powerplant is located just below Shasta Dam as part of the Shasta Division. Water from the dam is released through five 15-foot penstocks leading to the 5 main generating units and 2 station service units with a maximum generation capacity of 715 megawatts (MW). Shasta Powerplant is a peaking plant and generally runs when demand for electricity is high. Its

1 power is dedicated first to meeting the requirements of CVP facilities. The
2 remaining energy is marketed to customers in Northern California. The 2007 net
3 annual generation of Shasta Powerplant was 1,914,175 megawatt-hours (MWh).

4 **23.1.2 Upper Sacramento River (Shasta Dam to Red Bluff Pumping Plant)**

5 CVP powerplants located downstream from Shasta Reservoir but upstream from
6 the Red Bluff Pumping Plant are Trinity, Lewiston, Judge Francis Carr, and
7 Spring Creek powerplants of the Trinity River Division and Keswick
8 Powerplant of the Shasta Division. The Trinity River Division captures
9 headwaters from the Trinity River basin and diverts surplus water to the
10 Sacramento River.

11 Trinity Dam stores water from the Trinity River in Trinity Reservoir and makes
12 releases to the Trinity River through Trinity Powerplant. Downstream, Lewiston
13 Dam makes minimum required releases to the Trinity River through Lewiston
14 Powerplant and diverts water into Clear Creek Tunnel and through Judge
15 Francis Carr Powerplant to Whiskeytown Reservoir. Some Whiskeytown
16 Reservoir releases are made through Spring Creek Power Conduit and
17 Powerplant into Keswick Reservoir in the Shasta Division. The remaining
18 releases from Whiskeytown Reservoir are made to Clear Creek. Releases from
19 Keswick Reservoir are made through Keswick Powerplant to the Sacramento
20 River.

21 Keswick Powerplant belongs to the Shasta Division, is located at Keswick Dam,
22 and has 3 generating units with a total capacity of 105 MW. Keswick
23 Powerplant is a run-of-the-river facility, creating Shasta Powerplant's afterbay
24 and providing uniform flows to the Sacramento River.

25 **23.1.3 Lower Sacramento River and Delta**

26 Two CVP powerplants, Folsom and Nimbus, are located between Red Bluff
27 Pumping Plant and the Delta. Both powerplants belong to the Folsom Unit on
28 the American River.

29 Folsom Powerplant is a peaking powerplant, located at the foot of Folsom Dam
30 on the north side of the American River. Water from the dam is released
31 through three 15-foot-diameter penstocks to 3 generating units with a maximum
32 capacity of 199 MW. Folsom Dam was constructed by USACE and, on
33 completion, was transferred to Reclamation for coordinated operation as an
34 integral part of the CVP.

35 Nimbus Dam forms Lake Natoma to act as an afterbay for Folsom Powerplant.
36 It allows dam operators to coordinate power generation and flows in the lower
37 American River channel during normal reservoir operations. Nimbus
38 Powerplant, with 2 units and a maximum capacity of 13.5 MW, is a run-of-the-
39 river facility and provides station service backup for Folsom Powerplant.

1 **23.1.4 CVP/SWP Service Areas**

2 There are a number of generation facilities and pumping facilities in the greater
3 CVP/SWP service areas, beyond the specific geographies discussed above.
4 These facilities are discussed below.

5 ***CVP Generation Facilities***

6 The CVP powerplants located in the CVP south-of-Delta service area include
7 New Melones Powerplant in the New Melones Unit of the CVP East Side
8 Division, and the William R. Gianelli and O'Neill Pumping-Generating Plants
9 in the San Luis Unit of the CVP West San Joaquin Division. The latter two,
10 with dual functions of generating electricity and pumping water, are jointly
11 owned by Reclamation and DWR.

12 New Melones Dam was completed in 1979, and inundated the original Melones
13 Dam and created New Melones Reservoir on the Stanislaus River. New
14 Melones Powerplant, located on the north bank immediately downstream from
15 the dam, is a peaking plant. The powerplant contains 2 units and a maximum
16 capacity of 300 MW.

17 The San Luis Unit, part of both the CVP and SWP, was authorized in 1960.
18 Reclamation and the State of California constructed and operate this unit
19 jointly; 45 percent of the total cost was contributed by the Federal government
20 and the remaining 55 percent by the State of California. The joint-use facilities
21 are O'Neill Dam and Forebay, B.F. Sisk San Luis Dam, San Luis Reservoir,
22 William R. Gianelli Pumping-Generating Plant, Dos Amigos Pumping Plant,
23 Los Banos and Little Panoche Reservoirs, and San Luis Canal from O'Neill
24 Forebay to Kettleman City, together with the necessary switchyard facilities.
25 The Federal-only portion of the San Luis Unit includes O'Neill Pumping-
26 Generating Plant and Intake Canal, Coalinga Canal, Pleasant Valley Pumping
27 Plant, and San Luis Drain.

28 San Luis Reservoir serves as the major storage reservoir, and O'Neill Forebay
29 acts as an equalizing basin for the upper stage, dual-purpose pumping-
30 generating plant. O'Neill Pumping-Generating Plant takes water from the Delta-
31 Mendota Canal and discharges it into the O'Neill Forebay, where the California
32 Aqueduct (SWP feature) flows directly. William R. Gianelli Pumping-
33 Generating Plant lifts water from O'Neill Forebay and discharges it into San
34 Luis Reservoir. During releases from the reservoir, these plants generate electric
35 power by reversing flow through the turbines. Water for irrigation is released
36 into the San Luis Canal and flows by gravity to Dos Amigos Pumping Plant,
37 where the water is lifted more than 100 feet to permit gravity flow to the canal
38 terminus at Kettleman City. The SWP canal system continues to southern
39 coastal areas.

40 O'Neill Pumping-Generating Plant consists of an intake channel, leading off the
41 Delta-Mendota Canal, and six pumping-generating units. Normally, these units
42 operate as pumps to lift water from 45 to 53 feet into O'Neill Forebay; each unit

1 can discharge 700 cubic feet per second (cfs) and has a rating of 6,000
2 horsepower (hp). Water is occasionally released from the forebay to the Delta-
3 Mendota Canal, and these units then operate as generators; each unit has a
4 generating capacity of about 4.2 MW.

5 William R. Gianelli Pumping-Generating Plant, the joint Federal-State facility
6 located at San Luis Dam, lifts water by pump-turbines from O'Neill Forebay
7 into San Luis Reservoir. During the irrigation season, water is released from
8 San Luis Reservoir back through the pump-turbines to the forebay and energy is
9 reclaimed. Each of the eight pumping-generating units has a capacity of 63,000
10 hp as a motor and 53 MW as a generator. As a pumping plant to fill San Luis
11 Reservoir, each unit lifts 1,375 cfs at a design dynamic head of 290 feet. As a
12 generating plant, each unit passes 2,120 cfs at a design dynamic head of 197
13 feet.

14 **SWP Generation Facilities**

15 Among the eight SWP hydroelectric powerplants, three powerplants are located
16 in the Lake Oroville vicinity and the remaining in the south-of-Delta area.

17 Lake Oroville, the SWP's largest reservoir, stores winter and spring runoff from
18 the Feather River watershed and releases water for SWP needs. These releases
19 generate power at three powerplants: Edward Hyatt Pumping-Generating Plant,
20 Thermalito Diversion Dam Powerplant, and Thermalito Pumping-Generating
21 Plant (Oroville Facilities). DWR schedules hourly releases through the Oroville
22 Facilities to maximize the amount of energy produced when power values are
23 highest. Because the downstream water supply does not depend on hourly
24 releases, water released for power in excess of local and downstream
25 requirements is conserved by pump-back operation during off-peak times into
26 Lake Oroville. Energy prices primarily dictate hourly operations for the power
27 generation facilities.

28 The remaining five SWP powerplants are the jointly owned William R. Gianelli
29 Pumping-Generating Plant, Alamo Powerplant, Mojave Siphon Powerplant,
30 Devil Canyon Powerplant, and Warne Powerplant. They generate about one-
31 sixth of the total energy used by the SWP. Alamo Powerplant uses the 133-foot
32 head between Tehachapi Afterbay and Pool 43 of the California Aqueduct to
33 generate electricity. Mojave Siphon Powerplant generates electricity from water
34 flowing downhill after its 540-foot lift by Pearblossom Pumping Plant. Devil
35 Canyon Powerplant generates electricity with water from Silverwood Lake,
36 with more than 1,300 feet of head, the highest water head¹ in a powerplant in

¹ Potential hydropower generation is a function of the hydraulic net head and rate of fluid flow. The net head is the actual head available for power generation and is used for computing the energy generated. The net head is the gross head minus the head losses due to intake structures, penstocks, and outlet works. The gross or static head is the vertical distance between the tailwater elevation and the forebay water surface elevation (i.e., the height of water in the reservoir relative to its height after discharge). The head losses are generally assumed to be 2 to 10 percent of the gross head, depending on the configuration of the powerhouse structure.

1 the SWP system. Warne Powerplant uses the 725-foot drop from Peace Valley
2 Pipeline to generate electricity with its Pelton wheel turbines.

3 ***CVP Pumping Facilities***

4 CVP pumping plants that move water from the Delta to CVP service areas in
5 the Central Valley include C.W. “Bill” Jones Pumping Plant, O’Neill and
6 William R. Gianelli Pumping-Generating Plants, Dos Amigo Pumping Plant,
7 and SWP Banks Pumping Plant. Reclamation constructed and operates C.W.
8 “Bill” Jones Pumping Plant. Harvey O. Banks Pumping Plant is an SWP
9 facility; however, Reclamation has access to its pumping capacity by use of the
10 Joint Point of Diversion, described in the State Water Resources Control
11 Board’s Water Right Decision 1641. The remaining plants, described
12 previously, are joint-use facilities between the two agencies under the San Luis
13 Unit.

14 C.W. “Bill” Jones Pumping Plant, formerly Tracy Pumping Plant, is a
15 component of the CVP Delta Division. Construction of the plant started in 1947
16 and was completed in 1951, with an inlet channel, pumping plant, and discharge
17 pipes. Delta water is lifted 197 feet and is carried about 1 mile into the Delta-
18 Mendota Canal. Each of the 6 pumps at C.W. “Bill” Jones Pumping Plant is
19 powered by a 22,500-hp motor and is capable of pumping 767 cfs. The intake
20 canal includes the C.W. “Bill” Jones Fish Screen, which was built to intercept
21 downstream migrant fish to be returned to the main channel, to resume their
22 journey to the ocean.

23 Dos Amigos Pumping Plant is a joint CVP/SWP facility, located 17 miles south
24 of O’Neill Forebay on the San Luis Canal. It lifts water 113 feet to permit
25 gravity flow to the terminus of San Luis Canal at Kettleman City. The plant
26 contains 6 pumping units, each capable of delivering 2,200 cfs at 125 feet of
27 head.

28 ***SWP Pumping Facilities***

29 Among the SWP pumping plants, plants that historically consumed most of the
30 energy are William R. Gianelli Pumping-Generating Plant (SWP share), Harvey
31 O. Banks Pumping Plant, Dos Amigos Pumping Plant (SWP share), Ira J.
32 Chrisman Pumping Plant, and A.D. Edmonston Pumping Plant.

33 Harvey O. Banks Pumping Plant is located 2.5 miles southwest of Clifton Court
34 Forebay on the California Aqueduct. The plant is the first pumping plant for the
35 California Aqueduct and the South Bay Aqueduct. It provides the necessary
36 head² for water in the California Aqueduct to flow for approximately 80 miles
37 south, past O’Neill Forebay and San Luis Reservoir to Dos Amigos Pumping
38 Plant (another jointly owned facility, as previously described). Harvey O. Banks
39 Pumping Plant initially flows into Bethany Reservoir, where the South Bay

² In pumping plants, the design head is the gross head plus the head losses due to intake structures.

1 Aqueduct truly begins. The design head is 236–252 feet and installed capacity is
2 10,670 cfs with 333,000 hp.

3 Along the California Aqueduct, Pearblossom, Chrisman, and Edmonston
4 pumping plants historically consumed the highest amount of energy.
5 Pearblossom Pumping Plant lifts water about 540 feet and discharges it 3,479
6 feet above mean sea level (msl), the highest point along the entire California
7 Aqueduct. Chrisman and Edmonston pumping plants provide 524 and 1,970 feet
8 of lift, respectively, to convey California Aqueduct water across the Tehachapi
9 Mountains.

10 **23.2 Regulatory Framework**

11 There are two categories of regulatory framework for hydropower: Federal
12 regulations for CVP hydroelectric operations, and State regulations for the
13 SWP.

14 **23.2.1 Federal**

15 Reclamation operates the CVP system for water supply, environmental and
16 hydropower purposes, under various acts authorizing specific projects and with
17 other laws, permits, and enabling legislation (see the *Hydrology, Hydraulics,*
18 *and Water Management Technical Report* in the Physical Resources Appendix
19 for details).

20 The power generated by the CVP is marketed through contracts with the
21 Western Area Power Administration (Western). Western, created in 1977 under
22 the U.S. Department of Energy Organization Act, markets and transmits electric
23 power throughout 15 western states. Western's Sierra Nevada Customer Service
24 Region (also known as the Sierra Nevada Region) markets and transmits power
25 generated from the CVP and the Washoe Project in excess of CVP use.

26 The 2004 Marketing Plan for the Sierra Nevada Region specifies the terms and
27 conditions under which Western markets power from the CVP and the Washoe
28 Project that began on January 1, 2005. This marketing plan resulted in the
29 existing power marketing contract between Western and the CVP that expires
30 on December 31, 2024.

31 **23.2.2 State**

32 DWR is currently seeking a new 50-year hydroelectric license from the Federal
33 Energy Regulatory Commission to operate the Oroville Facilities. The DEIS is
34 available for public review and comment. The initial Federal Energy Regulatory
35 Commission license for the Oroville Facilities, issued on February 11, 1957,
36 expired on January 31, 2007. Currently, the Oroville Facilities are operating
37 under a license that was issued by the Federal Energy Regulatory Commission,
38 effective February 1, 2007, and being renewed each year in anticipation of
39 issuance of the new 50-year license.

1 **23.2.3 Regional and Local**

2 No known regional or local regulations govern power and energy resources.

3 **23.3 Environmental Consequences and Mitigation Measures**

4 The purpose of this section is to provide information about hydropower
5 generation, energy use, and impacts on existing hydropower facilities from the
6 SLWRI study alternatives described in the DEIS. Hydropower modeling for the
7 DEIS was conducted to identify potential impacts from the SLWRI on
8 hydropower generation and consumption at CVP and SWP facilities, which are
9 operated by Reclamation and DWR, respectively. This section describes the
10 analytical methodology used to calculate, for all alternatives, the hydropower
11 generation and pumping energy required at existing CVP and SWP hydropower
12 facilities. This chapter also describes criteria for determining significant impacts
13 associated with the SLWRI alternatives, and lists those impacts.

14 **23.3.1 Methods and Assumptions**

15 Council on Environmental Quality regulations and the State CEQA Guidelines
16 address NEPA and CEQA requirements for describing the potential
17 environmental consequences of alternatives in an EIS and EIR, respectively.
18 NEPA and CEQA requirements guide the assessments presented in this section.
19 Appendix F of the State CEQA Guidelines addresses energy conservation, and
20 NEPA directs that energy requirements and conservation potential are to be
21 evaluated. This impact assessment is based on quantitative data regarding
22 changes to hydropower resources that could occur under the program
23 alternatives in geographic locales within the study area.

24 Several modeling tools were used for the SLWRI hydropower analysis. The
25 CalSim-II model was used to simulate project operations and LongTermGen
26 (LTGen) and State Water Project Power (SWPPower) power tools were used to
27 quantify the hydropower generation and pumping energy associated with each
28 alternative. A spreadsheet postprocessor was used to evaluate impacts to the Pit
29 7 Powerplant.

30 ***Power Modeling Tools***

31 Energy estimates were made using the Benchmark Study Team (BST) power
32 modeling tools LTGen, Version 1.18, and SWPPower, BST April 2010 Version,
33 for CVP and SWP facilities, respectively. LTGen and SWPPower use
34 operations data from CalSim-II simulations to predict energy generation and
35 consumption throughout the CVP and SWP. Methods applied to evaluate power
36 generation are discussed below.

37 For each alternative, outputs from CalSim-II simulation were input to LTGen
38 and SWPPower, to simulate power generation and consumption throughout the
39 CVP and SWP systems, respectively. These CalSim-II outputs included
40 reservoir releases, conveyance flow rates, and end-of-month reservoir storage

1 data. Both LTGen and SWPPower are monthly models. Their simulation
2 periods are from October 31, 1921 to September 30, 2003.

3 In LTGen and SWPPower, energy generation is a function of turbine
4 configuration, reservoir release, net head, and duration of generation. Net head
5 is the actual head available for power generation; it is reservoir water surface
6 elevation (a function of storage) minus tailrace elevation (a function of release).

7 Similarly, the calculation of energy required for pumping in both models is a
8 function of pump configuration, pumping rate, pumping head (i.e., net head
9 with hydraulic losses), and duration of pumping. Detailed descriptions of
10 LTGen and SWPPower are included in Chapter 8 of the Modeling Appendix.

11 **CalSim-II**

12 CalSim-II is the application of the Water Resources Integrated Modeling
13 System software to the CVP/SWP. This application was jointly developed by
14 Reclamation and DWR for planning studies related to CVP/SWP operations.
15 The primary purpose of CalSim-II is to evaluate the water supply reliability of
16 the CVP and SWP at current and/or future levels of development (e.g., 2005 or
17 2030), with and without various assumed future facilities, and with different
18 modes of facility operations. Geographically, the model covers the drainage
19 basin of the Delta, and CVP/SWP exports to the San Francisco Bay Area, San
20 Joaquin Valley, Central Coast, and Southern California.

21 CalSim-II typically simulates system operations for an 82-year period, using a
22 monthly time step. The model assumes that facilities, land use, water supply
23 contracts, and regulatory requirements are constant over this period,
24 representing a fixed level of development (e.g., 2005 or 2030). The historical
25 flow record from October 1921 to September 2003, adjusted for the influences
26 of land use changes and upstream flow regulation, is used to represent the
27 possible range of water supply conditions. Major Central Valley rivers,
28 reservoirs, and CVP/SWP facilities are represented by a network of arcs and
29 nodes. CalSim-II uses a mass balance approach to route water through this
30 network. Simulated flows are mean flows for the month; reservoir storage
31 volumes correspond to end-of-month storage.

32 Monthly CalSim-II model results are intended to be used for comparative
33 purposes. It is important to differentiate between “absolute” or “predictive”
34 modeling applications and “comparative” applications. In “absolute”
35 applications, the model is run once to predict a future outcome; errors or
36 assumptions in formulation, system representation, data, and operational criteria
37 all contribute to total error or uncertainty in model results. In “comparative”
38 applications, the model is run twice, once to represent a baseline condition (no
39 project) and a second time with a specific change (project) to assess the change
40 in the outcome due to the input change. In this comparative mode (the mode
41 used for this DEIS), the difference between the two simulations is of principal
42 importance. Potential errors or uncertainties that exist in the “no project”

1 simulation are also present in the “project” simulation, such that their impacts
2 are reduced when assessing the change in outcomes.

3 ***Spreadsheet Postprocessors***

4 For analysis of impacts from each alternative on generation from the Pit 7
5 Powerplant, a spreadsheet postprocessor was used in lieu of a model. Since no
6 model was available for Pit 7 Powerplant operations, an evaluation of potential
7 impacts of the SLWRI alternatives, as simulated using CalSim-II on recent
8 historical data, was used instead.

9 The spreadsheet postprocessor interpolated CalSim-II output for Shasta
10 Reservoir storage to determine the reservoir water surface elevation. The water
11 surface elevations for each alternative were compared to historical Pit 7
12 Powerplant tailwater elevations, to calculate the change in net head at the Pit 7
13 Powerplant. Changes in net head at the Pit 7 Powerplant were assumed to be
14 small enough so that turbine/generator efficiencies would be unaffected. For
15 each alternative, the monthly generation was determined by multiplying
16 historical average monthly generation by the ratio of the alternative-reduced net
17 head compared to the historical net head (assumed to be 200 feet, based on
18 historical average) raised to the 1.5 power.

19 **23.3.2 Criteria for Determining Significance of Effects**

20 The thresholds of significance for impacts to power and energy are based on the
21 environmental checklist in Appendix G of the State CEQA Guidelines, as
22 amended. These thresholds also encompass the factors taken into account under
23 NEPA to determine the significance of an action in terms of its context and the
24 intensity of its impacts. An alternative would be considered to have a potentially
25 significant impact on regional hydropower production if the change in the
26 average annual energy generation or consumption (over the 82-year period of
27 simulation) by the CVP/SWP is greater than 5 percent, as shown in Table 23-1.

28 A threshold of 5 percent was selected as the threshold of significance for
29 hydroelectric generation for several reasons, including seasonal and annual
30 hydrologic variability, short-term operations decisions that may affect water
31 level in storage, and regional power market demands and prices that may dictate
32 hydropower facilities operations. All these factors could contribute to
33 potentially substantial variations in hydropower generation on a monthly or
34 annual basis. As a result, generation variations of less than 5 percent would not
35 be considered significant. Significance statements are relative to both existing
36 conditions (2005) and future conditions (2030), unless stated otherwise.

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Table 23-1. Impact Indicators and Significance Criteria for Energy Generation and Usage

Impact Indicator	Significance Criterion
Shasta Powerplant Energy Generation	Decrease in average annual Shasta Powerplant hydropower generation of more than 5 percent.
CVP System Energy Generation	Decrease in average annual CVP system hydropower generation of more than 5 percent.
SWP System Energy Generation	Decrease in average annual SWP system hydropower generation of more than 5 percent.
CVP System Pumping Energy Use	Increase in average annual CVP system pumping energy use of more than 5 percent.
SWP System Pumping Energy Use	Increase in average annual SWP system pumping energy use of more than 5 percent.
Pit 7 Powerplant Energy Generation	Decrease in average annual Pit 7 hydropower generation of more than 5 percent.

Key:
 CVP = Central Valley Project
 SWP = State Water Project

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Shasta Powerplant Energy Generation

Changes in Shasta Powerplant operations due to any of the SLWRI alternatives could directly affect hydropower generation caused by changes in head and flow available for hydropower generation. A significant reduction in energy generation at Shasta Powerplant could require purchase of energy to meet CVP pumping energy demands, or a reduction in power revenue.

CVP System Energy Generation

Changes in CVP operations due to any of the SLWRI alternatives could result in reoperation of other CVP hydropower generation facilities, and could result in a systemwide decrease in CVP hydropower generation. A significant reduction in CVP energy generation could require purchase of energy to meet CVP pumping energy demands, or a reduction in power revenue.

SWP System Energy Generation

Changes in SWP operations due to any of the SLWRI alternatives could result in reoperation of SWP generation facilities, and could result in a systemwide decrease in SWP hydropower generation. A significant reduction in SWP energy generation could require purchase of energy to meet SWP pumping energy demands, or a reduction in power revenue.

CVP Pumping Energy Use

Changes in CVP operations due to any of the SLWRI alternatives could result in changes in operations of the CVP pumping plants. A significant increase in CVP system pumping energy use could require purchase of energy to meet CVP pumping energy demands, or a reduction in power revenue.

SWP Pumping Energy Use

Changes in SWP operations due to any of the SLWRI alternatives could result in changes in operations of the SWP pumping plants. A significant increase in

1 SWP system pumping energy use could require purchase of energy to meet
2 SWP pumping energy demands, or a reduction in power revenue.

3 ***Pit 7 Powerplant Energy Generation***

4 The Pit 7 Powerplant is owned and operated by the Pacific Gas and Electric
5 Company. Increases in Shasta Lake water surface elevations could increase the
6 tailwater elevation below the Pit 7 Powerplant, reducing the net head and
7 decreasing generation.

8 **23.3.3 Direct and Indirect Effects**

9 This section describes the environmental consequences of the SLWRI
10 comprehensive plans, and proposed mitigation measures for any impacts
11 determined to be significant or potentially significant. All comprehensive plans
12 are compared to a baseline to allow evaluation of potential impacts. For the
13 existing condition a 2005 level of development) CalSim-II simulation without
14 any Shasta enlargement is used. Similarly, for the future condition a 2030 level
15 of development CalSim-II simulation, the No-Action Alternative, is used as a
16 baseline. Each of the comprehensive plans were simulated using the same
17 levels of development so that any changes from the baseline hydropower
18 generation or consumption can be attributed the alternative. Detailed tables of
19 the monthly energy generation and energy consumption associated with each
20 comprehensive plan are included in Attachment 18 of the Modeling Appendix.

21 The No-Action Alternative and five SLWRI comprehensive plans are described
22 in the following subsections. Potential effects of the existing condition, No-
23 Action Alternative, and various SLWRI comprehensive plans on energy
24 generation and usage are also described.

25 ***No-Action Alternative***

26 Under the No-Action Alternative, the Federal government would take
27 reasonably foreseeable actions, as discussed in Chapter 2, but would take no
28 additional action toward implementing a specific plan to help increase
29 anadromous fish survival in the upper Sacramento River, nor would help
30 address the growing water reliability issues in California. Shasta Dam would not
31 be modified, and the CVP would continue operating similar to the existing
32 condition. Changes in regulatory conditions and water supply demands would
33 result in differences in flows on the Sacramento River and in the Delta between
34 existing and future conditions. Possible changes include the following:

- 35 • Firm Level 2 Federal refuge deliveries
- 36 • SWP deliveries based on full Table A amounts
- 37 • Full implementation of the Grassland Bypass Project
- 38 • Implementation of salinity management actions similar to the Vernalis
39 Adaptive Management Plan

- 1 • Implementation of the South Bay Aqueduct Improvement and
- 2 Enlargement Project
- 3 • Increased San Joaquin River diversions for water users in the Stockton
- 4 Metropolitan Area after completion of the Delta Water Supply Project
- 5 • Increased Sacramento River diversions by Freeport Regional Water
- 6 Project agencies
- 7 • San Joaquin River Restoration Program Full Restoration Flows

8 This alternative is used as a basis of comparison for future condition
9 comparisons. Table 23-2 summarizes the simulated average annual hydropower
10 generation and energy use for the No-Action Alternative.

11 **Table 23-2. Simulated Average Annual Energy Generation and Use for No-**
12 **Action Alternative**

	Existing (GWh)	No Action (GWh)	Change (GWh)	Percent Change
Impact Hydro-1 – Decrease in Shasta Powerplant Energy Generation	2,151	2,154	3	0%
Impact Hydro-2 – Decrease in CVP System Energy Generation	4,909	4,897	-12	0%
Impact Hydro-3 – Decrease in SWP System Energy Generation	4,427	4,513	86	2%
Impact Hydro-4 – Increase in CVP System Pumping Energy Use	1,445	1,447	2	0%
Impact Hydro-5 – Increase in SWP System Pumping Energy Use	7,600	7,933	333	4%
Impact Hydro-6 – Decrease in Pit 7 Powerplant Energy Generation	529	529	0	0%

Key:
CVP = Central Valley Project
GWh = gigawatt-hour
SWP = State Water Project

13 **Impact Hydro-1 (No-Action): Decrease in Shasta Powerplant Energy**
14 **Generation** Simulated annual average Shasta Powerplant energy generation
15 for the No-Action Alternative is shown in Table 23-2. Under the No-Action
16 Alternative, there would be an increase in simulated average annual generation
17 of 3 gigawatt-hour (GWh) (0 percent). This impact would be beneficial.
18 Mitigation is not required for the No-Action Alternative.

1 **Impact Hydro-2 (No-Action): Decrease in CVP System Energy Generation**

2 Simulated average annual CVP system energy generation for the No-Action
3 Alternative is shown in Table 23-2. Under the No-Action Alternative, there
4 would be a decrease in simulated average annual energy generation of 12 GWh
5 (0 percent). This impact would be less than significant. Mitigation is not
6 required for the No-Action Alternative.

7 **Impact Hydro-3 (No-Action): Decrease in SWP System Energy Generation**

8 Simulated average annual CVP system energy generation for the No-Action
9 Alternative is shown in Table 23-2. Under the No-Action Alternative, there
10 would be an increase in simulated average annual energy generation of 86 GWh
11 (2 percent). This impact would be beneficial. Mitigation is not required for the
12 No-Action Alternative.

13 **Impact Hydro-4 (No-Action): Increase in CVP System Pumping Energy**

14 **Use** Simulated average annual CVP pumping energy use for the No-Action
15 Alternative is shown in Table 23-2. Under the No-Action Alternative, there
16 would be an increase in simulated average annual pumping energy use of 2
17 GWh (0 percent). This impact would be less than significant. Mitigation is not
18 required for the No-Action Alternative.

19 **Impact Hydro-5 (No-Action): Increase in SWP System Pumping Energy**

20 **Use** Simulated average annual SWP pumping energy use for the No-Action
21 Alternative is shown in Table 23-2. Under the No-Action Alternative, there
22 would be an increase in simulated average annual pumping energy use of 333
23 GWh (4 percent). This impact would be less than significant. Mitigation is not
24 required for the No-Action Alternative.

25 **Impact Hydro-6 (No-Action): Decrease in Pit 7 Powerplant Energy**

26 **Generation** Simulated average annual Pit 7 Powerplant energy generation for
27 the No-Action Alternative is shown in Table 23-2. Under the No-Action
28 Alternative, there would be no change in simulated average annual energy
29 generation at the Pit 7 Powerplant. Therefore, no impact would occur.
30 Mitigation is not required for the No-Action Alternative.

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

33 CP1 focuses on increasing water supply reliability and increasing anadromous
34 fish survival. This plan primarily consists of raising Shasta Dam by 6.5 feet,
35 which, in combination with spillway modifications, would increase the height of
36 the reservoir's full pool by 8.5 feet and enlarge the total storage capacity in the
37 reservoir by 256,000 acre-feet. The existing temperature control device (TCD)
38 would also be extended to achieve efficient use of the expanded cold-water
39 pool. Shasta Dam operational guidelines would continue essentially unchanged,
40 except during dry years³ and critical years, when 70 thousand acre-feet (TAF)

³ Throughout this document, water year types are defined according to the Sacramento Valley Index Water Year Hydrologic Classification unless specified otherwise.

1 and 35 TAF, respectively, of the increased storage capacity in Shasta Reservoir
 2 would be reserved to specifically focus on increasing M&I deliveries. CP1
 3 would help reduce future water shortages by increasing drought year and
 4 average year water supply reliability for agricultural, and municipal and
 5 industrial (M&I) deliveries. In addition, the increased depth and volume of the
 6 cold-water pool in Shasta Reservoir would contribute to improving seasonal
 7 water temperatures for anadromous fish in the upper Sacramento River. Table
 8 23-3 summarizes the simulated average annual hydropower generation and
 9 energy use for CP1.

10 **Table 23-3. Simulated Average Annual Energy Generation and Use for CP1**

	Existing (GWh)	CP1 (GWh)	Change		Future (GWh)	CP1 (GWh)	Change	
			(GWh)	Percent			GWh	Percent
Impact Hydro-1 – Decrease in Shasta Energy Generation	2,151	2,191	40	2%	2,154	2,194	40	2%
Impact Hydro-2 – Decrease in CVP System Energy Generation	4,909	4,948	39	1%	4,897	4,937	40	1%
Impact Hydro-3 – Decrease in SWP System Energy Generation	4,427	4,440	13	0%	4,513	4,527	14	0%
Impact Hydro-4 – Increase in CVP System Pumping Energy Use	1,445	1,453	8	1%	1,447	1,458	11	1%
Impact Hydro-5 – Increase in SWP System Pumping Energy Use	7,600	7,642	42	1%	7,933	7,979	46	1%
Impact Hydro-6 – Decrease in Pit 7 Powerplant Energy Generation	529	525	-4	-1%	529	525	-4	-1%

Key:
 CVP = Central Valley Project
 GWh = gigawatt-hour
 SWP = State Water Project

11 **Impact Hydro-1 (CP1): Decrease in Shasta Powerplant Energy Generation**
 12 Simulated average annual Shasta Powerplant energy generation for CP1
 13 shown in Table 23-3. Under CP1, there would be an increase in simulated
 14 average annual generation under both existing and future levels of 40 GWh (2
 15 percent). This impact would be beneficial. Mitigation for this impact is not
 16 needed, and thus not proposed.

17 **Impact Hydro-2 (CP1): Decrease in CVP System Energy Generation**
 18 Simulated average annual CVP system generation for CP1 is shown in Table

1 23-3. Under CP1, there would be an increase in simulated average annual
2 energy generation of 39 GWh (1 percent) and 40 GWh (1 percent) under
3 existing and future levels, respectively. This impact would be beneficial.
4 Mitigation for this impact is not needed, and thus not proposed.

5 **Impact Hydro-3 (CP1): Decrease in SWP System Energy Generation**

6 Simulated average annual CVP system generation for CP1 is shown in Table
7 23-3. Under CP1, there would be an increase in simulated average annual
8 energy generation of 13 GWh (0 percent) and 14 GWh (0 percent) under
9 existing and future levels, respectively. This impact would be less than
10 significant. Mitigation for this impact is not needed, and thus not proposed.

11 **Impact Hydro-4 (CP1): Increase in CVP System Pumping Energy Use**

12 Simulated average annual CVP pumping energy use for CP1 is shown in Table
13 23-3. Under CP1, there would be an increase in simulated average annual
14 pumping energy use of 8 GWh (1 percent) and 11 GWh (1 percent) under
15 existing and future levels, respectively. This impact would be less than
16 significant. Mitigation for this impact is not needed, and thus not proposed.

17 **Impact Hydro-5 (CP1): Increase in SWP System Pumping Energy Use**

18 Simulated average annual SWP pumping energy use for CP1 is shown in Table
19 23-3. Under CP1, there would be an increase in simulated average annual
20 pumping energy use of 42 GWh (1 percent) and 46 GWh (1 percent) under
21 existing and future levels, respectively. This impact would be less than
22 significant. Mitigation for this impact is not needed, and thus not proposed.

23 **Impact Hydro-6 (CP1): Decrease in Pit 7 Powerplant Energy Generation**

24 Simulated average annual Pit 7 generation for CP1 is shown in Table 23-3.
25 Under CP1, the 6.5-foot Shasta Dam raise option, the operating range of net
26 head would decrease from about 173 to 204 feet to about 168 to 193 feet, an
27 approximately 4 percent decrease in net head. Under CP1, there would be a
28 decrease in simulated average annual generation of about 4 GWh (1 percent)
29 and 4 GWh (1 percent) under existing and future levels, respectively. This
30 impact would be less than significant. Mitigation for this impact is not needed,
31 and thus not proposed.

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

34 As with CP1, CP2 focuses on increasing water supply reliability and increasing
35 anadromous fish survival. CP2 primarily consists of raising Shasta Dam by 12.5
36 feet, which, in combination with spillway modifications, would increase the
37 height of the reservoir's full pool by 14.5 feet and enlarge the total storage
38 capacity in the reservoir by 443,000 acre-feet. The existing TCD would also be
39 extended to achieve efficient use of the expanded cold-water pool. Shasta Dam
40 operational guidelines would continue essentially unchanged, except during dry
41 years and critical years, when 120 TAF and 60 TAF, respectively, of the
42 increased storage capacity in Shasta Reservoir would be reserved to specifically

1 focus on increasing M&I deliveries. CP2 would help reduce future water
2 shortages by increasing drought year and average year water supply reliability
3 for agricultural and M&I deliveries. In addition, the increased depth and volume
4 of the cold-water pool in Shasta Reservoir would contribute to improving
5 seasonal water temperatures for anadromous fish in the upper Sacramento
6 River. Table 23-4 summarizes the simulated average annual hydropower
7 generation and energy use for CP2.

8 **Table 23-4. Simulated Average Annual Energy Generation and Use for CP2**

	Existing (GWh)	CP2 (GWh)	Change		Future (GWh)	CP2 (GWh)	Change	
			GWh	Percent			GWh	Percent
Impact Hydro-1 – Decrease in Shasta Powerplant Energy Generation	2,151	2,221	70	3%	2,154	2,221	67	3%
Impact Hydro- 2 – Decrease in CVP System Energy Generation	4,909	4,980	71	1%	4,897	4,966	69	1%
Impact Hydro- 3 – Decrease in SWP System Energy Generation	4,427	4,444	17	0%	4,513	4,535	22	0%
Impact Hydro- 4 – Increase in CVP System Pumping Energy Use	1,445	1,458	13	1%	1,447	1,464	17	1%
Impact Hydro-5 – Increase in SWP System Pumping Energy Use	7,600	7,660	60	1%	7,933	8,005	72	1%
Impact Hydro-6 – Decrease in Pit 7 Powerplant Energy Generation	529	520	-9	-2%	529	522	-7	-1%

Key:
CVP = Central Valley Project
GWh = gigawatt-hour
SWP = State Water Project

9
10 **Impact Hydro-1 (CP2): Decrease in Shasta Powerplant Energy Generation**
11 Simulated average annual Shasta Powerplant energy generation for CP2 is
12 shown in Table 23-4. Under CP2, there would be an increase in simulated
13 average annual generation of 70 GWh (3 percent) and 67 GWh (3 percent)
14 under existing and future levels, respectively. This impact would be beneficial.
15 Mitigation for this impact is not needed, and thus not proposed.

16 **Impact Hydro-2 (CP2): Decrease in CVP System Energy Generation**
17 Simulated average annual CVP system generation for CP2 is shown in Table
18 23-4. Under CP2, there would be an increase in simulated average annual
19 energy generation of 71 GWh (1 percent) and 69 GWh (1 percent) under

1 existing and future levels, respectively. This impact would be beneficial.
2 Mitigation for this impact is not needed, and thus not proposed.

3 **Impact Hydro-3 (CP2): Decrease in SWP System Energy Generation**

4 Simulated average annual CVP system generation for CP2 is shown in Table
5 23-4. Under CP2, there would be an increase in simulated average annual
6 energy generation of 17 GWh (0 percent) and 22 GWh (0 percent) under
7 existing and future levels, respectively. This impact would be beneficial.
8 Mitigation for this impact is not needed, and thus not proposed.

9 **Impact Hydro-4 (CP2): Increase in CVP System Pumping Energy Use**

10 Simulated average annual CVP pumping energy use for CP2 is shown in Table
11 23-4. Under CP2, there would be an increase in simulated average annual
12 pumping energy use of 13 GWh (1 percent) and 17 GWh (1 percent) under
13 existing and future levels, respectively. This impact would be less than
14 significant. Mitigation for this impact is not needed, and thus not proposed.

15 **Impact Hydro-5 (CP2): Increase in SWP System Pumping Energy Use**

16 Simulated average annual SWP pumping energy use for CP2 is shown in Table
17 23-4. Under CP2, there would be an increase in simulated average annual
18 pumping energy use of 60 GWh (1 percent) and 72 GWh (1 percent) under
19 existing and future levels, respectively. This impact would be less than
20 significant. Mitigation for this impact is not needed, and thus not proposed.

21 **Impact Hydro-6 (CP2): Decrease in Pit 7 Powerplant Energy Generation**

22 Simulated average annual Pit 7 generation for CP2 is shown in Table 23-4.
23 Under CP2 the operating range of net head would decrease from about 173 to
24 204 feet to about 168 to 193 feet, an approximately 4 percent decrease in net
25 head. Under CP2, there would be a decrease in simulated average annual
26 generation of about 9 GWh (2 percent) and 7 GWh (1 percent) under existing
27 and future levels, respectively. This impact would be less than significant.
28 Mitigation for this impact is not needed, and thus not proposed.

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

31 CP3 focuses on increasing agricultural water supply reliability while also
32 increasing anadromous fish survival. This plan primarily consists of raising
33 Shasta Dam by 18.5 feet, which, in combination with spillway modifications,
34 would increase the height of the reservoir's full pool by 20.5 feet and enlarge
35 the total storage capacity in the reservoir by 634,000 acre-feet. The existing
36 TCD would also be extended to achieve efficient use of the expanded cold-
37 water pool. Because CP3 focuses on increasing agricultural water supply
38 reliability, none of the increased storage capacity in Shasta Reservoir would be
39 reserved for increasing M&I deliveries. Operations for water supply,
40 hydropower, and environmental and other regulatory requirements would be
41 similar to existing operations, with the additional storage retained for water
42 supply reliability and to expand the cold-water pool for downstream

1 anadromous fisheries. Simulations of CP3 did not involve any changes to the
2 modeling logic for deliveries or flow requirements; all rules for water
3 operations were updated to include the new storage but were not otherwise
4 changed. Table 23-5 summarizes the simulated average annual hydropower
5 generation and energy use for CP3.

6 **Table 23-5. Simulated Average Annual Energy Generation and Use for CP3**

	Existing (GWh)	CP3 (GWh)	Change		Future (GWh)	CP3 (GWh)	Change	
			GWh	Percent			GWh	Percent
Impact Hydro-1 – Decrease in Shasta Powerplant Energy Generation	2,151	2,248	97	5%	2,154	2,249	95	4%
Impact Hydro-2 – Decrease in CVP System Energy Generation	4,909	5,007	98	2%	4,897	4,992	95	2%
Impact Hydro-3 – Decrease in SWP System Energy Generation	4,427	4,429	2	0%	4,513	4,508	-5	0%
Impact Hydro-4 – Increase in CVP System Pumping Energy Use	1,445	1,468	23	2%	1,447	1,482	35	2%
Impact Hydro-5 – Increase in SWP System Pumping Energy Use	7,600	7,606	6	0%	7,933	7,917	-16	0%
Impact Hydro-6 – Decrease in Pit 7 Powerplant Energy Generation	529	514	-15	-3%	529	514	-15	-3%

Key:
CVP = Central Valley Project
GWh = gigawatt-hour
SWP = State Water Project

7 **Impact Hydro-1 (CP3): Decrease in Shasta Powerplant Energy Generation**
8 Simulated average annual Shasta Powerplant energy generation for CP3 is
9 shown in Table 23-5. Under CP3, there would be an increase in simulated
10 average annual generation of 97 GWh (5 percent) and 95 GWh (4 percent)
11 under existing and future levels, respectively. This impact would be beneficial.
12 Mitigation for this impact is not needed, and thus not proposed.

13 **Impact Hydro-2 (CP3): Decrease in CVP System Energy Generation**
14 Simulated average annual CVP system generation for CP3 is shown in Table
15 23-5. Under CP3, there would be an increase in simulated average annual
16 energy generation of 98 GWh (2 percent) and 95 GWh (2 percent) under
17 existing and future levels, respectively. This impact would be beneficial.
18 Mitigation for this impact is not needed, and thus not proposed.

1 **Impact Hydro-3 (CP3): Decrease in SWP System Energy Generation**

2 Simulated average annual CVP system generation for CP3 is shown in Table
3 23-5. Under CP3, there would be an increase in simulated average annual
4 energy generation of 2 GWh (0 percent) under the existing level and a decrease
5 of 5 GWh (0 percent) under the future level. This impact would be beneficial
6 under the existing level and less than significant under the future level.
7 Mitigation for this impact is not needed, and thus not proposed.

8 **Impact Hydro-4 (CP3): Increase in CVP System Pumping Energy Use**

9 Simulated average annual CVP pumping energy use for CP3 is shown in Table
10 23-5. Under CP3, there would be an increase in simulated average annual
11 pumping energy use of 23 GWh (2 percent) and 35 GWh (2 percent) under
12 existing and future levels, respectively. This impact would be less than
13 significant. Mitigation for this impact is not needed, and thus not proposed.

14 **Impact Hydro-5 (CP3): Increase in SWP System Pumping Energy Use**

15 Simulated average annual SWP pumping energy use for CP3 is shown in Table
16 23-5. Under CP3, there would be an increase in simulated average annual
17 pumping energy use of 6 GWh (0 percent) under the existing level and a
18 decrease of 16 GWh (0 percent) under the future level. This impact would be
19 less than significant and beneficial under the existing level and less than
20 significant under the future level. Mitigation for this impact is not needed, and
21 thus not proposed.

22 **Impact Hydro-6 (CP3): Decrease in Pit 7 Powerplant Energy Generation**

23 Simulated average annual Pit 7 Powerplant generation for CP3 is shown in
24 Table 23-5. Under CP3 the operating range of net head would decrease to about
25 156 to 181 feet, an approximate 10 percent reduction in net head. Under CP3,
26 there would be a decrease in simulated average annual generation of 15 GWh (3
27 percent) under both the existing and future levels. This impact would be less
28 than significant. Mitigation for this impact is not needed, and thus not proposed.

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

31 CP4 focuses on increasing anadromous fish survival while also increasing water
32 supply reliability. By raising Shasta Dam 18.5 feet, in combination with
33 spillway modifications, CP4 would increase the height of the reservoir full pool
34 by 20.5 feet and enlarge the total storage capacity in the reservoir by 634,000
35 acre-feet. The existing TCD would also be extended to achieve efficient use of
36 the expanded cold-water pool. The additional storage created by the 18.5-foot
37 dam raise would be used to improve the ability to meet temperature objectives
38 and habitat requirements for anadromous fish during drought years and increase
39 water supply reliability. Of the increased reservoir storage space, about 378,000
40 acre-feet would be dedicated to increasing the supply of cold water for
41 anadromous fish survival purposes. Operations for the remaining portion of
42 increased storage (approximately 256,000 acre-feet) would be the same as for
43 CP1, with 70 TAF and 35 TAF reserved to specifically focus on increasing

1 M&I deliveries during dry and critical years, respectively. CP4 also includes
2 augmenting spawning gravel and restoring riparian, floodplain, and side channel
3 habitat in the upper Sacramento River. Table 23-6 summarizes the simulated
4 average annual hydropower generation and energy use for CP4.

5 **Table 23-6. Simulated Average Annual Energy Generation and Use for CP4**

	Existing (GWh)	CP4 (GWh)	Change		Future (GWh)	CP4 (GWh)	Change	
			GWh	Percent			GWh	Percent
Impact Hydro-1 – Decrease in Shasta Powerplant Energy Generation	2,151	2,269	118	5%	2,154	2,273	119	6%
Impact Hydro-2 – Decrease in CVP System Energy Generation	4,909	5,026	117	2%	4,897	5,016	119	2%
Impact Hydro-3 – Decrease in SWP System Energy Generation	4,427	4,440	13	0%	4,513	4,527	14	0%
Impact Hydro-4 – Increase in CVP System Pumping Energy Use	1,445	1,453	8	1%	1,447	1,458	11	1%
Impact Hydro-5 – Increase in SWP System Pumping Energy Use	7,600	7,642	42	1%	7,933	7,979	46	1%
Impact Hydro-6 – Decrease in Pit 7 Powerplant Energy Generation	529	519	-10	-2%	529	519	-10	-2%

Key:
CVP = Central Valley Project
GWh = gigawatt-hour
SWP = State Water Project

6 **Impact Hydro-1 (CP4): Decrease in Shasta Powerplant Energy Generation**
7 Simulated average annual Shasta Powerplant energy generation for CP4 is
8 shown in Table 23-6. Under CP4, there would be an increase in simulated
9 average annual generation of 118 GWh (5 percent) and 119 GWh (6 percent)
10 under existing and future levels, respectively. This impact would be beneficial.
11 Mitigation for this impact is not needed, and thus not proposed.

12 **Impact Hydro-2 (CP4): Decrease in CVP System Energy Generation**
13 Simulated average annual CVP system generation for CP4 is shown in Table
14 23-6. Under CP4, there would be an increase in simulated average annual
15 energy generation of 117 GWh (2 percent) and 119 GWh (2 percent) under
16 existing and future levels, respectively. This impact would be beneficial.
17 Mitigation for this impact is not needed, and thus not proposed.

1 **Impact Hydro-3 (CP4): Decrease in SWP System Energy Generation**

2 Simulated average annual CVP system generation for CP4 is shown in Table
3 23-6. Under CP4, there would be an increase in simulated average annual
4 energy generation of 13 GWh (0 percent) and 14 GWh (0 percent) under
5 existing and future levels, respectively. This impact would be less than
6 significant. Mitigation for this impact is not needed, and thus not proposed.

7 **Impact Hydro-4 (CP4): Increase in CVP System Pumping Energy Use**

8 Simulated average annual CVP pumping energy use for CP4 is shown in Table
9 23-6. Under CP4, there would be an increase in simulated average annual
10 pumping energy use of 8 GWh (1 percent) and 11 GWh (1 percent) under
11 existing and future levels, respectively. This impact would be less than
12 significant. Mitigation for this impact is not needed, and thus not proposed.

13 **Impact Hydro-5 (CP4): Increase in SWP System Pumping Energy Use**

14 Simulated average annual SWP pumping energy use for CP4 is shown in Table
15 23-6. Under CP4, there would be an increase in simulated average annual
16 pumping energy use of 42 GWh (1 percent) under both the existing and future
17 levels. This impact would be less than significant. Mitigation for this impact is
18 not needed, and thus not proposed.

19 **Impact Hydro-6 (CP4): Decrease in Pit 7 Powerplant Energy Generation**

20 Simulated average annual Pit 7 Powerplant generation for CP4 is shown in
21 Table 23-6. Under CP4 the operating range of net head would decrease to about
22 156 to 181 feet, an approximate 10 percent reduction in net head. Under CP4,
23 there would be a decrease in simulated average annual generation of 10 GWh (2
24 percent) under both the existing and future levels. This impact would be less
25 than significant. Mitigation for this impact is not needed, and thus not proposed.

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

27 CP5 primarily focuses on increasing water supply reliability, anadromous fish
28 survival, Shasta Lake area environmental resources, and recreation
29 opportunities. By raising Shasta Dam 18.5 feet, in combination with spillway
30 modifications, CP5 would increase the height of the reservoir full pool by 20.5
31 feet and enlarge the total storage capacity in the reservoir by 634,000 acre-feet.
32 The existing TCD would be extended to achieve efficient use of the expanded
33 cold-water pool. Shasta Dam operational guidelines would continue essentially
34 unchanged, except during dry years and critical years, when 150 TAF and 75
35 TAF, respectively, of the increased storage capacity in Shasta Reservoir would
36 be reserved to specifically focus on increasing M&I deliveries. CP5 also
37 includes constructing additional fish habitat in and along the shoreline of Shasta
38 Lake and along the lower reaches of its tributaries; augmenting spawning gravel
39 and restoring riparian, floodplain, and side channel habitat in the upper
40 Sacramento River; and increasing recreation opportunities at Shasta Lake. CP5
41 would help reduce future water shortages by increasing drought year and
42 average year water supply reliability for agricultural and M&I deliveries. In
43 addition, the increased depth and volume of the cold-water pool in Shasta

1 Reservoir would contribute to improving seasonal water temperatures for
2 anadromous fish in the upper Sacramento River. Table 23-7 summarizes the
3 simulated average annual hydropower generation and energy use for CP5.

4 **Table 23-7. Simulated Average Annual Energy Generation and Use for CP5**

	Existing (GWh)	CP5 (GWh)	Change		Future (GWh)	CP5 (GWh)	Change	
			GWh	Percent			GWh	Percent
Impact Hydro-1 – Decrease in Shasta Powerplant Energy Generation	2,151	2,247	96	4%	2,154	2,247	93	4%
Impact Hydro-2 – Decrease in CVP System Energy Generation	4,909	5,004	95	2%	4,897	4,990	93	2%
Impact Hydro-3 – Decrease in SWP System Energy Generation	4,427	4,449	22	0%	4,513	4,537	24	1%
Impact Hydro-4 – Increase in CVP System Pumping Energy Use	1,445	1,463	18	1%	1,447	1,475	28	2%
Impact Hydro-5 – Increase in SWP System Pumping Energy Use	7,600	7,674	74	1%	7,933	8,018	85	1%
Impact Hydro-6 – Decrease in Pit 7 Powerplant Energy Generation	529	514	-15	-3%	529	514	-15	-3%

Key:
CVP = Central Valley Project
GWh = gigawatt-hour
SWP = State Water Project

5
6 **Impact Hydro-1 (CP5): Decrease in Shasta Powerplant Energy Generation**
7 Simulated average annual Shasta Powerplant energy generation for CP5 is
8 shown in Table 23-7. Under CP5, there would be an increase in simulated
9 average annual generation of 96 GWh (4 percent) and 93 GWh (4 percent)
10 under existing and future levels, respectively. This impact would be beneficial.
11 Mitigation for this impact is not needed, and thus not proposed.

12 **Impact Hydro-2 (CP5): Decrease in CVP System Energy Generation**
13 Simulated average annual CVP system generation for CP5 is shown in Table
14 23-7. Under CP5, there would be an increase in simulated average annual
15 energy generation of 95 GWh (2 percent) and 93 GWh (2 percent) under
16 existing and future levels, respectively. This impact would be beneficial.
17 Mitigation for this impact is not needed, and thus not proposed.

18 **Impact Hydro-3 (CP5): Decrease in SWP System Energy Generation**
19 Simulated average annual CVP system generation for CP5 is shown in Table

1 23-7. Under CP5, there would be an increase in simulated average annual
2 energy generation of 22 GWh (0 percent) and 24 GWh (1 percent) under
3 existing and future levels, respectively. This impact would be less than
4 significant. Mitigation for this impact is not needed, and thus not proposed.

5 **Impact Hydro-4 (CP5): Increase in CVP System Pumping Energy Use**
6 Simulated average annual CVP pumping energy use for CP5 is shown in Table
7 23-7. Under CP5, there would be an increase in simulated average annual
8 pumping energy use of 18 GWh (1 percent) and 28 GWh (2 percent) under
9 existing and future levels, respectively. This impact would be less than
10 significant. Mitigation for this impact is not needed, and thus not proposed.

11 **Impact Hydro-5 (CP5): Increase in SWP System Pumping Energy Use**
12 Simulated average annual SWP pumping energy use for CP5 is shown in Table
13 23-7. Under CP5, there would be an increase in simulated average annual
14 pumping energy use of 74 GWh (1 percent) and 85 GWh (1 percent) under
15 existing and future levels, respectively. This impact would be less than
16 significant. Mitigation for this impact is not needed, and thus not proposed.

17 **Impact Hydro-6 (CP5): Decrease in Pit 7 Powerplant Energy Generation**
18 Simulated average annual Pit 7 Powerplant generation for CP5 is shown in
19 Table 23-7. Under CP5 the operating range of net head would decrease to about
20 156 to 181 feet, an approximate 10 percent reduction in net head. Under CP5,
21 there would be a decrease in simulated average annual generation of 15 GWh (3
22 percent) under both the existing and future levels. This impact would be less
23 than significant. Mitigation for this impact is not needed, and thus not proposed.

24 **23.3.4 Mitigation Measures**

25 Table 23-8 presents a summary of impacts and mitigation measures for power
26 and energy. No potentially significant impacts have been identified; therefore,
27 no mitigation is required.

1 **Table 23-8. Summary of Impacts and Mitigation Measures – Power and Energy**

Impact		No-Action Alternative	CP1	CP2	CP3	CP4	CP5
Impact Hydro-1: Decrease in Shasta Powerplant Energy Generation	LOS before Mitigation	Beneficial	Beneficial	Beneficial	Beneficial	Beneficial	Beneficial
	Mitigation Measure	None required	No mitigation needed; thus, none proposed.				
	LOS after Mitigation	Beneficial	Beneficial	Beneficial	Beneficial	Beneficial	Beneficial
Impact Hydro-2: Decrease in CVP System Energy Generation	LOS before Mitigation	LTS	Beneficial	Beneficial	Beneficial	Beneficial	Beneficial
	Mitigation Measure	None required	No mitigation needed; thus, none proposed.				
	LOS after Mitigation	LTS	Beneficial	Beneficial	Beneficial	Beneficial	Beneficial
Impact Hydro-3: Decrease in SWP System Energy Generation	LOS before Mitigation	Beneficial	LTS	Beneficial	LTS	LTS	LTS
	Mitigation Measure	None required	No mitigation needed; thus, none proposed.				
	LOS after Mitigation	Beneficial	LTS	Beneficial	LTS	LTS	LTS
Impact Hydro-4: Increase in CVP System Pumping Energy Use	LOS before Mitigation	LTS	LTS	LTS	LTS	LTS	LTS
	Mitigation Measure	None required	No mitigation needed; thus, none proposed.				
	LOS after Mitigation	LTS	LTS	LTS	LTS	LTS	LTS
Impact Hydro-5: Increase in SWP System Pumping Energy Use	LOS before Mitigation	LTS	LTS	LTS	LTS	LTS	LTS
	Mitigation Measure	None required	No mitigation needed; thus, none proposed.				
	LOS after Mitigation	LTS	LTS	LTS	LTS	LTS	LTS
Impact Hydro-6: Decrease in Pit 7 Powerplant Energy Generation	LOS before Mitigation	No Impact	LTS	LTS	LTS	LTS	LTS
	Mitigation Measure	None required	No mitigation needed; thus, none proposed.				
	LOS after Mitigation	No Impact	LTS	LTS	LTS	LTS	LTS

Key:
LOS = Level of Significance
LTS = Less than Significant
NI = No Impact
PS = Potentially Significant

2

3 **23.3.5 Cumulative Effects**

4 Chapter 3 discusses the overall cumulative impacts of the project alternatives,
5 including the relationship to CALFED Programmatic Cumulative Impacts
6 Analysis, qualitative and quantitative assessment, past and future actions in the
7 study area, and significance criteria. This section provides an analysis of overall
8 cumulative impacts of the project alternatives with other past, present, and
9 reasonably foreseeable future projects producing related impacts. The projects
10 listed in the quantitative analysis section of Chapter 3 are included in the 2030
11 level-of-development alternatives. Accordingly, quantitative effects of the
12 projects combined with the SLWRI alternatives are described in Section 23.3.3.
13 Project alternatives would cause less-than-significant impacts on hydropower
14 generation and consumption. The discussion below focuses on the qualitative
15 effect of the SLWRI alternatives and other past, present, and reasonably
16 foreseeable future projects.

1 The effects of climate change on operations at Shasta Lake could potentially
2 result in changes to power and energy. As described in the Climate Change
3 Projection Appendix, climate change could result in higher reservoir releases in
4 the winter and early spring due to an increase in runoff during these times.
5 Similarly, climate change could result in lower reservoir inflows and
6 Sacramento tributary flows during the late spring and summer due to a
7 decreased snow pack. This reduction in inflow and tributary flow could result in
8 Shasta Lake storage being reduced due to both a reduced ability to capture
9 flows and an increased need to make releases to meet downstream requirements.

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

12 When combined with other past, present, and reasonably foreseeable future
13 projects, a change in river flows and reservoir elevations would be likely. Since
14 Shasta Reservoir is operated to meet flow and water quality requirements in the
15 Sacramento River and Delta, any new project or program along the Sacramento
16 River and in the Delta could potentially impact the CVP and SWP facility
17 hydropower generation and consumption of CP1. With the implementation of
18 many of the projects, Shasta Reservoir could be reoperated, which would result
19 in changes to the Sacramento River flow regime and reservoir elevations, and
20 could cause a potentially significant impact on CVP/SWP facility hydropower
21 generation and consumption.

22 As stated previously, effects of climate change on operations of Shasta Lake
23 could include increased inflows and releases at certain times of the year, and
24 decreased inflows and storage at other times. The additional storage associated
25 with CP1 would potentially diminish these effects and allow Shasta Lake to
26 capture some of the increased runoff in the winter and early spring for release in
27 late spring and summer. Additionally, the increased storage volume would
28 allow Shasta Lake to maintain greater storage and potentially greater
29 hydropower generation. Therefore, the addition of anticipated effects of climate
30 change would not result in CP1 having a significant cumulative impact.

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

33 When combined with other past, present, and reasonably foreseeable future
34 projects, a change in river flows and reservoir elevations would be likely. Since
35 Shasta Reservoir is operated to meet flow and water quality requirements in the
36 Sacramento River and Delta, any new project or program along the Sacramento
37 River and in the Delta could potentially impact the CVP and SWP facility
38 hydropower generation and consumption of CP2. With the implementation of
39 many of the projects, Shasta Reservoir could be reoperated, which would result
40 in changes to the Sacramento River flow regime and reservoir elevations, and
41 could cause a potentially significant impact on CVP/SWP facility hydropower
42 generation and consumption.

1 As stated previously, effects of climate change on operations of Shasta Lake
2 could include increased inflows and releases at certain times of the year, and
3 decreased inflows and storage at other times. The additional storage associated
4 with CP2 would potentially diminish these effects and allow Shasta Lake to
5 capture some of the increased runoff in the winter and early spring for release in
6 late spring and summer. Additionally, the increased storage volume would
7 allow Shasta Lake to maintain greater storage and potentially greater
8 hydropower generation. Therefore, the addition of anticipated effects of climate
9 change would not result in CP2 having a significant cumulative impact.

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

12 When combined with other past, present, and reasonably foreseeable future
13 projects, a change in river flows and reservoir elevations would be likely. Since
14 Shasta Reservoir is operated to meet flow and water quality requirements in the
15 Sacramento River and Delta, any new project or program along the Sacramento
16 River and in the Delta could potentially impact the CVP and SWP facility
17 hydropower generation and consumption of CP3. With the implementation of
18 many of the projects, Shasta Reservoir could be reoperated, which would result
19 in changes to the Sacramento River flow regime and reservoir elevations, and
20 could cause a potentially significant impact on CVP/SWP facility hydropower
21 generation and consumption.

22 As stated previously, effects of climate change on operations of Shasta Lake
23 could include increased inflows and releases at certain times of the year, and
24 decreased inflows and storage at other times. The additional storage associated
25 with CP3 would potentially diminish these effects and allow Shasta Lake to
26 capture some of the increased runoff in the winter and early spring for release in
27 late spring and summer. Additionally, the increased storage volume would
28 allow Shasta Lake to maintain greater storage and potentially greater
29 hydropower generation. Therefore, the addition of anticipated effects of climate
30 change would not result in CP3 having a significant cumulative impact.

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

33 When combined with other past, present, and reasonably foreseeable future
34 projects, a change in river flows and reservoir elevations would be likely. Since
35 Shasta Reservoir is operated to meet flow and water quality requirements in the
36 Sacramento River and Delta, any new project or program along the Sacramento
37 River and in the Delta could potentially impact the CVP and SWP facility
38 hydropower generation and consumption of CP4. With the implementation of
39 many of the projects, Shasta Reservoir could be reoperated, which would result
40 in changes to the Sacramento River flow regime and reservoir elevations, and
41 could cause a potentially significant impact on CVP/SWP facility hydropower
42 generation and consumption.

1 As stated previously, effects of climate change on operations of Shasta Lake
2 could include increased inflows and releases at certain times of the year, and
3 decreased inflows and storage at other times. The additional storage associated
4 with CP4 would potentially diminish these effects and allow Shasta Lake to
5 capture some of the increased runoff in the winter and early spring for release in
6 late spring and summer. Additionally, the increased storage volume would
7 allow Shasta Lake to maintain greater storage and potentially greater
8 hydropower generation. Therefore, the addition of anticipated effects of climate
9 change would not result in CP4 having a significant cumulative impact.

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

11 When combined with other past, present, and reasonably foreseeable future
12 projects, a change in river flows and reservoir elevations would be likely. Since
13 Shasta Reservoir is operated to meet flow and water quality requirements in the
14 Sacramento River and Delta, any new project or program along the Sacramento
15 River and in the Delta could potentially impact the CVP and SWP facility
16 hydropower generation and consumption of CP5. With the implementation of
17 many of the projects, Shasta Reservoir could be reoperated, which would result
18 in changes to the Sacramento River flow regime and reservoir elevations, and
19 could cause a potentially significant impact on CVP/SWP facility hydropower
20 generation and consumption.

21 As stated previously, effects of climate change on operations of Shasta Lake
22 could include increased inflows and releases at certain times of the year, and
23 decreased inflows and storage at other times. The additional storage associated
24 with CP5 would potentially diminish these effects and allow Shasta Lake to
25 capture some of the increased runoff in the winter and early spring for release in
26 late spring and summer. Additionally, the increased storage volume would
27 allow Shasta Lake to maintain greater storage and potentially greater
28 hydropower generation. Therefore, the addition of anticipated effects of climate
29 change would not result in CP5 having a significant cumulative impact.

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Chapter 24

Environmental Justice

24.1 Affected Environment

24.1.1 Minority and Low-Income Populations

The environmental setting of a project area can be viewed from both a geographic perspective and a human perspective. The physical environment provides a geographical context for the populations to be evaluated in this EIS. The human perspective encompasses race, ethnic origin, and economic status of affected groups.

The intent of an environmental justice evaluation under Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority and Low Income Populations* (1994), is to identify communities and groups that meet environmental justice criteria, and suggest strategies to reduce potential adverse impacts of projects on affected groups.

In its guide to environmental justice under NEPA, the Council on Environmental Quality (CEQ) (1997) encourages agencies to consider all of the following groups in the scoping process:

- Religious organizations
- Newspapers, radio, and other media
- Civic associations
- Minority business associations
- Environmental and environmental justice organizations
- Legal aid providers
- Homeowners', tenants', and neighborhood watch groups
- Federal, State, local, and tribal governments
- Rural cooperatives
- Business and trade organizations

- 1 • Community and social service organizations
- 2 • Universities, colleges, vocational, and other schools
- 3 • Labor organizations
- 4 • Civil rights organizations
- 5 • Local schools and libraries
- 6 • Senior citizens' groups
- 7 • Public health agencies and clinics

8 ***Shasta Lake and Vicinity***

9 This section reviews minority and low-income communities situated near the
10 reservoir, and those that directly depend on it for social, economic, cultural,
11 historic, occupational, recreational, or other needs deemed significant by these
12 communities.

13 Table 24-1 depicts a historically white population that is slowly diversifying
14 and income levels consistently below the statewide average, resulting in
15 relatively higher poverty rates among all ethnic groups. In 2010, the population
16 of Shasta County was approximately 16.6 percent minority (nonwhite) and
17 approximately 17.7 percent low-income, compared to statewide populations of
18 42.4 percent minority and 15.5 percent low-income. The slightly higher local
19 poverty rate is not meaningfully greater than the statewide rate.

20 **Lakehead-Lakeshore Community** The Lakehead-Lakeshore community is
21 located along Shasta Lake's northernmost reach, the Sacramento River Arm.
22 Lakehead, an unincorporated seasonal community of approximately 1,500
23 residents (U.S. Census Bureau 2010a), is adjacent to Interstate 5 and includes
24 typical services found near a major interstate highway. Lakehead provides a
25 variety of campgrounds, boat ramps, and marinas. The Lakehead community
26 includes low-income and minority residents and workers who could be affected
27 by project construction and changes in outdoor recreation patterns resulting
28 from the project.

29 **Tourism and Outdoor Recreation Industry** Shasta Lake and its vicinity are
30 recreation destinations that draw visitors from throughout California. Most
31 facilities in the area depend on Shasta Lake to draw visitors and customers.
32 The tourism and outdoor recreation service industries are included in this
33 discussion because this group includes a community of lower-paid service
34 workers that could be affected by project actions related to Shasta Dam.
35 A change in recreation opportunities could affect employment and revenue
36 patterns, as well as social and recreational opportunities for minority or low-
37 income residents. With the exception of Lakehead, the settlement and

1 recreation-related development along Shasta Lake falls within unincorporated
 2 Shasta County. Residents and workers are dispersed throughout Shasta County,
 3 and affected minority and low-income communities are reflected in
 4 demographic data for Shasta County as shown in Table 24-1.

5 **Table 24-1. Ethnicity, Income, and Poverty Trends in Shasta and Tehama**
 6 **Counties and California**

Topic		Shasta County	Tehama County	State of California
Race/Ethnicity	White, 2010	153,726	51,721	21,453,934
	White, 2000–2010 (% change)	5.4	8.8	6.4
	Black or African American, 2010	1,548	406	2,299,072
	Black or African American, 2000–2010 (% change)	26.4	27.7	1.6
	American Indian, including Alaskan Natives, 2010	4,950	1,644	362,801
	American Indian, including Alaskan Natives, 2000–2010 (% change)	9.3	41.3	8.8
	Asian or Pacific Islander, 2010	4,662	732	5,005,393
	Asian or Pacific Islander, 2000–2010 (% change)	37.0	47.9	31.2
	Two or more races (total), 2010	7,846	2,702	1,815,384
	Two or more races (total), 2000–2010 (% change)	38.6	42.3	12.9
	Hispanic Origin (any race), 2010	14,878	13,906	14,013,719
	Hispanic Origin (any race), 2000–2010 (% change)	65.3	56.8	27.8
Income/Poverty	Median Household Income, 2000	\$34,335	\$31,206	\$47,493
	Median Household Income, 2010	\$42,931	\$39,392	\$59,641
	% Change, 2000–2010	25.0	26.2	25.5
	% of Individuals Below Poverty Level, 2000	15.4	17.3	14.2
	% of Individuals Below Poverty Level, 2010	17.7	19.5	15.5
	% Change, 2000–2010	2.3	2.2	1.3
	% of Children (< 18) Below Poverty Level, 2000	21.0	24.0	19.0
	% of Children (< 18) Below Poverty Level, 2010	23.4	27.9	21.6
	% Change, 2000–2010	2.4	3.9	2.6

Sources: U.S. Census Bureau 2002a, 2002b, 2002c, 2009a, 2010b

1 **Areas of Native American Concern** As described in Chapter 14, “Cultural
2 Resources,” the Sacramento River and its major tributaries, particularly the Pit
3 and McCloud rivers, were the focus of intensive Native American occupation
4 during historic times, with a variety of religious, economic, historic, and other
5 values identified here for Native American groups. Ten groups, including those
6 listed by the Native American Heritage Commission, represent Native
7 American interests in the study area. They include Grindstone Indian Rancheria,
8 Paskenta Band of Nomlaki Indians, Pit River Environmental Council, Pit River
9 Tribe of California, Redding Rancheria, Shasta Nation, United Tribe of
10 Northern California, Inc., Winnemem Wintu Tribe, Wintu Educational and
11 Cultural Council, and the Wintu Tribe of Northern California.

12 The Winnemem Wintu have identified important localities within the study
13 area, many of which are locations where ceremonies are regularly conducted.
14 Along the McCloud River, these include Children’s Rock, Coyote Rock,
15 Dekkas Rock, doctoring pools near Nawtawaket Creek, Eagle Rock and
16 Samwel Cave, Hirz Bay, *Kaibai* village, North Gray Rocks, Puberty Rock,
17 Saddle Rock, and *Watawacket* village and spiritual area. Along the Sacramento
18 River, important localities include the Antlers area, Delta area, Doney Creek,
19 Gregory Creek, LaMoine area, Packers Bay, Pollard’s area, middle Salt Creek,
20 and Sims area. The Winnemem Wintu have strong traditional and contemporary
21 connections with the land, and their ongoing use of many archaeological and
22 religious sites is fundamental to the well-being of their culture, particularly the
23 education of their youth.

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

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

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

38 Many social and public services are provided and a range of resource-dependent
39 cultural activities take place in the cities of Shasta Lake, Redding, Anderson,
40 Cottonwood, and Red Bluff. Each of these communities could be affected
41 during project operation as a result of improved flood protection, enhanced
42 water supply reliability, and increased recreational opportunities and spending
43 related to improved salmonid habitat. Redding and Shasta County may be most

1 affected because local residents, businesses, public services, and fiscal resources
2 likely would also be affected by construction-related spending and activities.

3 Groups affected by the project could include minority and low-income
4 populations such as transient and seasonal workers, Native American and
5 Hispanic/Latino populations, and low-income water and electric utility
6 customers. In 2010, the population of Tehama County was approximately 18.0
7 percent minority (nonwhite) and 19.5 percent low-income, compared to
8 statewide populations of 42.4 percent minority and 15.5 percent low-income
9 (Table 24-1). Poverty levels in Shasta and Tehama counties were exceeding
10 statewide levels in 2010.

11 These groups often share the need for a reliable income and low costs of living,
12 access to steady jobs, the need to protect the profitability of businesses that
13 affect their personal income, access to high-quality public services, access to
14 affordable and diverse housing, and a desire to enjoy a high quality of life.

15 Minority and low-income populations in the upper Sacramento River portion of
16 the primary study area, many of which are employed by local agricultural
17 operations, are especially susceptible to changes in employment opportunities.
18 Changes in water and power supply reliability or delivery costs can have a
19 major effect on the cost of living and on the operating costs and financial health
20 of local businesses and employers. Changes in the frequency and duration of
21 flooding along the Sacramento River and in the Delta also could affect
22 agricultural operations and business owners and employees.

23 ***Lower Sacramento River and Delta***

24 As discussed in Chapter 16, “Socioeconomics, Population, and Housing,” this
25 portion of the extended study area includes Red Bluff, the largest city in
26 Tehama County with a population of 13,825 in 2010, and nine counties to the
27 south. In 2010, the population of those nine counties totaled 4,226,027 (DOF
28 2010). The minority population of the nine counties was 42.6 percent overall,
29 which is approximately the same as the statewide populations of 42.4 percent.
30 Glenn County had the lowest proportion of minority populations, while
31 Sacramento and San Joaquin counties had the highest proportion (U.S. Census
32 Bureau 2010c). In 2010, poverty levels in the region ranged from 10 percent to
33 20 percent, with low-income populations exceeding the 15.5 percent state
34 poverty level in Butte, Glenn, Sacramento, San Joaquin, and Yolo counties
35 (U.S. Census Bureau 2009b).

36 Regional employment and labor trends are generally consistent with statewide
37 trends. In 2010, approximately 15.6 percent of the labor force in the nine-county
38 area was unemployed, compared to 7.7 percent statewide (U.S. Census Bureau
39 2009b). Butte, Colusa, Sacramento, San Joaquin, Solano, and Sutter counties
40 registered higher unemployment rates than California as a whole. The counties
41 with the highest unemployment rates in 2010 were characterized by greater
42 dependence on the agricultural industry and less industrial diversity. Five of the

1 six counties with unemployment rates above the statewide average maintained
2 more than 60 percent of their land mass in agricultural production.

3 Unemployment rates tend to be higher in rural areas than in urban areas because
4 farm work is typically seasonal or temporary.

5 The lower Sacramento River region becomes increasingly urbanized as the river
6 flows past the city of Sacramento and toward the Delta. Along its course, the
7 river passes through low-density agricultural and suburban metropolitan areas
8 and near high-density centers of commerce and culture such as Sacramento. In
9 the Delta, a complex network of highways and urban infrastructure is integrated
10 with canals, dikes, and levees. Heavily engineered water control and
11 conveyance systems have promoted and sustained a successful agriculture
12 industry and protected the region against damaging floods.

13 ***CVP/SWP Service Areas***

14 The CVP and SWP service areas include 36 of California's 58 counties,
15 accounting for 91 percent (38,648,090 residents) of California's population in
16 2010 (DOF 2010). Minority groups have been steadily increasing and such
17 ethnic diversification is expected to continue. As shown in Table 24-1, the
18 population of individuals in California identifying themselves as Asian-Pacific
19 Islander or multiracial experienced double-digit population growth, while those
20 identifying themselves as Black or African American experienced the least
21 amount of growth between 2000 and 2010 (U.S. Census Bureau 2010b).
22 Hispanics are the most numerous minority group in California, and many
23 members of this ethnic group work on farms that receive some or all of their
24 water from the CVP. In general, rural agricultural counties have smaller
25 minority populations than urban counties.

26 Poverty levels for both individuals and children increased slightly between 2000
27 and 2010. The percentage of people below the poverty level is expected to
28 follow national and statewide economic trends. Generally, poverty rates tend to
29 be higher in rural counties than in urban counties. Despite these differences,
30 each of California's major urban areas has pockets of low-income
31 neighborhoods with high poverty (and unemployment) rates. Minority and low-
32 income communities that might be affected by the project include communities
33 adjacent to construction projects, gateway and service communities providing
34 support to construction-related activities, and low-income customers of water
35 and power utilities who might experience higher rates as a result of costs of
36 project-related system improvements.

37 These residents and workers may be most vulnerable to increases in CVP water
38 and power costs and, conversely, would benefit from improved flood protection
39 and CVP water and power supply reliability. Central Valley farm workers and
40 other workers employed by businesses in the region that supply goods and
41 services to agricultural operations also could benefit.

1 24.2 Regulatory Framework

2 24.2.1 Federal

3 ***Executive Order 12898***

4 The purpose of Executive Order 12898 (part of which is excerpted in the
5 introduction to this chapter) is to identify and address the disproportionate
6 placement of adverse environmental, economic, social, or health impacts from
7 Federal actions and policies on minority and/or low-income communities. This
8 order requires lead agencies to evaluate impacts on minority or low-income
9 populations during preparation of environmental and socioeconomic analyses of
10 projects or programs that are proposed, funded, or licensed by Federal agencies.

11 In addition to the direction referenced above, Executive Order 12898 includes
12 the following requirements:

- 13 • Each Federal agency shall conduct its programs, policies, and activities
14 that substantially affect human health or the environment, in a manner
15 that ensures that such programs, policies, and activities do not have the
16 effect of excluding persons (including populations) from participation
17 in, denying persons (including populations) the benefits of, or
18 subjecting persons (including populations) to discrimination under,
19 such programs, policies, and activities, because of their race, color, or
20 national origin. (*Section 2-2*)
- 21 • Each Federal agency shall work to ensure that public documents,
22 notices, and hearings relating to human health or the environment are
23 concise, understandable, and readily accessible to the public. (*Section*
24 *5-5(c)*)

25 In addition, the presidential memorandum accompanying the executive order
26 states that “(e)ach Federal agency shall analyze the environmental effects,
27 including human health, economic and social effects, of Federal actions,
28 including effects on minority communities and low-income communities, when
29 such analysis is required by the NEPA of 1969.”

30 Two documents provide some measure of guidance to agencies required to
31 implement Executive Order 12898. The first is *Environmental Justice Guidance*
32 *Under the National Environmental Policy Act* (December 1997), published by
33 CEQ. The second document, the *Final Guidance for Incorporating*
34 *Environmental Justice Concerns* (April 1998) published in the U.S.
35 Environmental Protection Agency’s NEPA Compliance Analysis, serves as a
36 guide for incorporating environmental justice goals into preparation of the EIS
37 under NEPA. These documents provide specific guidelines for assessing
38 environmental justice effects associated with a proposed Federal project.

1 **24.2.2 State**

2 There are no State plans, policies, regulations, or laws related to environmental
3 justice applicable to the project. However, Senate Bill 115 (Chapter 690,
4 Statutes of 1999), signed into law in 1999, defined environmental justice in
5 statute and established the Governor’s Office of Planning and Research as the
6 coordinating agency for State environmental justice programs (California
7 Government Code, Section 65040.12). This law further required the California
8 Environmental Protection Agency to develop a model environmental justice
9 mission statement for boards, departments, and offices within the agency by
10 January 1, 2001 (Public Resources Code, Sections 72000–72001). The purpose
11 of this program is to inform decision-makers by providing guidance on
12 environmental justice issues.

13 **24.2.3 Regional and Local**

14 There are no regional or local plans, policies, regulations, or laws related to
15 environmental justice applicable to the project.

16 **24.3 Environmental Consequences and Mitigation Measures**

17 This section describes the potential environmental consequences of the project
18 alternatives as they relate to environmental justice. This analysis relies on
19 demographic data provided in the *Socioeconomics, Population, and Housing*
20 *Technical Report* and incorporates that information as necessary to describe
21 potential effects on minority and low-income communities.

22 **24.3.1 Methods and Assumptions**

23 According to CEQ and U.S. Environmental Protection Agency guidelines
24 established to assist Federal and State agencies, a minority population is present
25 in a project area if (1) the minority population of the affected area exceeds 50
26 percent, or (2) the minority-population percentage of the affected area is
27 meaningfully greater than the minority-population percentage in the general
28 population or other appropriate unit of geographic analysis. By the same rule, a
29 low-income population exists if the project area consists of 50 percent or more
30 people living below the poverty threshold, as defined by the U.S. Census
31 Bureau, or is meaningfully greater than the poverty percentage of the general
32 population or other appropriate unit of geographic analysis.

33 The CEQ guidance indicates that when agencies determine whether
34 environmental effects are disproportionately high and adverse, they are to
35 consider whether there is or would be an impact on the natural or physical
36 environment (as defined by NEPA) that would adversely affect a minority
37 population or low-income population.

38 None of the published guidelines define the term “disproportionately high and
39 adverse,” but CEQ includes a nonquantitative definition stating that an effect is

1 disproportionate if it appreciably exceeds the risk or rate to the general
2 population (CEQ 1997).

3 The following population characteristics are considered in this analysis:

- 4 • Race and ethnicity
- 5 • Per-capita income as it relates to the poverty level

6 The relevant demographic data were obtained from the U.S. Census Bureau and
7 the California Department of Finance. Data are presented at the county level to
8 accommodate the geographic size of each portion of the study area.

9 In this analysis, a county is considered to have a minority population if its
10 nonwhite population is greater than 50 percent or is meaningfully larger than the
11 general (statewide) nonwhite population. Low-income areas are defined as
12 counties in which the percentage of the population below poverty status exceeds
13 50 percent, or is meaningfully greater than the general population (average
14 statewide poverty level).

15 ***Native American Outreach***

16 Public and stakeholder coordination meetings were conducted on behalf of
17 Reclamation with Native American tribal groups whose traditional territories
18 overlap the primary study area. Seven tribal groups were invited to an
19 information meeting held on April 4, 2007, in Redding, California. The purpose
20 of the meeting was to provide general information about the project, initiate
21 Section 106 consultation with groups desiring to participate in the project, and
22 introduce Elena Nilsson as the Native American Tribal Coordination study lead.
23 Invitations were sent to the Grindstone Rancheria, Paskenta Rancheria, Pit
24 River Tribe, Redding Rancheria, Shasta Nation, Winnemem Wintu, and the
25 Wintu Tribe and Toyon-Wintu Center. The meeting was attended by
26 representatives from the Winnemem Wintu and the Madesi Band of the Pit
27 River Tribe.

28 Between August 2007 and March 2008, nine meetings were held with Native
29 American groups whose traditional territories overlap with the primary study
30 area. These included meetings and/or workshops with groups and individuals
31 representing major tribes and/or extended family groups in the Shasta/Redding
32 area regarding potential effects on cultural resources from a plan to enlarge
33 Shasta Dam. The purposes of the meetings were to solicit, clarify, and
34 document major concerns and issues regarding the project, and to establish a
35 preferred method/approach to maintaining effective communication during the
36 remainder of the project study and in future endeavors. Five groups participated
37 in these meetings: Grindstone Indian Rancheria (one meeting), Paskenta Band
38 of Nomlaki Indians (one meeting), Pit River Tribe (three meetings), Shasta
39 Nation (one meeting), and Winnemem Wintu (three meetings).

24.3.2 Criteria for Determining Disproportionately High and Adverse Effects

To make a finding that disproportionately high and adverse effects would likely fall on minority or low-income populations, three conditions must be met simultaneously:

- There must be a minority or low-income population in the impact zone.
- A high and adverse impact must exist.
- The impact must be disproportionately high and adverse on the minority or low-income population.

24.3.3 Topics Eliminated from Further Consideration

No topics related to environmental justice that are included in the significance criteria listed above have been eliminated from further consideration. All relevant topics are analyzed below.

Effects on sites considered sacred by local Native American communities in the upper Sacramento River portion of the primary study area and the lower Sacramento River and Delta and CVP and SWP service areas have been eliminated from further discussion. No impacts on these resources are anticipated as a result of changes in Shasta Dam operations (i.e., storage and release scenarios). Furthermore, any construction activities near sites considered sacred by local Native American communities would require mitigation as stated in Chapter 14 “Cultural Resources”, including compliance with Section 106 of the National Historic Preservation Act (NHPA). As a result, no disproportionately high and adverse effects on Native American populations would be expected; therefore, potential effects related to this topic in these geographic regions are not discussed further in this EIS.

24.3.4 Direct and Indirect Effects

No-Action Alternative

Shasta Lake and Vicinity

Impact EJ-1 (No-Action): Potential Disproportionate High and Adverse Effect on Minority and Low-Income Populations in the Vicinity of Shasta Lake

Communities at Shasta Lake and in the vicinity would remain below minority and low-income thresholds as they relate to environmental justice. Adverse construction-related impacts would be avoided, and construction-related employment opportunities and gains within local economies would not be realized. Existing adverse effects on minority or low-income populations do not constitute a disproportionately high and adverse impact. No disproportionately high and adverse effects on minority or low-income populations would occur.

Shasta County would maintain its steady population growth under the No-Action Alternative. Between 1990 and 2010, the population increased by 25.3

1 percent, with total population projected to reach 196,087 by 2020 (DOF 2010,
2 2012). The minority (nonwhite) population, including the Winnemem Wintu
3 Tribe and other Native Americans, is projected to account for 16.6 percent of
4 the total population in Shasta County in 2020, slightly more than the current
5 14.3 percent representation, but less than the 62.5 percent minority population
6 projected statewide for 2020.

7 As described in Table 24-1, the poverty level in Shasta County increased by 2.3
8 percent during 2000 to 2010, and unemployment rates in Shasta County were
9 mostly steady during 2000 to 2010, fluctuating between 6.0 and 8.1 percent.
10 However, the poverty and unemployment rates are expected to decrease as the
11 economy recovers. Employment opportunities continue to be provided in the
12 region by major employment sectors such as trade, transportation, and utilities;
13 government; educational, and health services; and leisure and hospitality
14 industries (see Chapter 16, “Socioeconomics, Population, and Housing”).
15 Professional and business services and education and health services are
16 projected to be the leading growth industries in Shasta County; these are also
17 the top two anticipated growth industries statewide. No disproportionately high
18 or adverse impacts on minority or low-income communities are anticipated
19 under the No-Action Alternative. Mitigation is not required for the No-Action
20 Alternative.

21 *Impact EJ-2 (No-Action): Potential Disproportionate High and Adverse Effect*
22 *on Native American Populations from Disturbance or Loss of Sacred Locations*
23 *in the Vicinity of Shasta Lake* Shasta Dam would not be enlarged; no
24 infrastructure would be removed, modified, or relocated; and no changes in
25 Reclamation’s Shasta Lake operations would occur. No disproportionately high
26 and adverse effects on Native American populations would occur.

27 Under the No-Action Alternative, Shasta Dam would not be enlarged; no
28 infrastructure would be removed, modified, or relocated; and no changes in
29 Reclamation’s Shasta Lake operations would occur. Therefore, there would be
30 no effect on several locations in the vicinity of Shasta Lake that are considered
31 sacred by local Native American communities. No disproportionately high and
32 adverse effects on Native American populations would occur. Mitigation is not
33 required for the No-Action Alternative.

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

35 *Impact EJ-3 (No-Action): Potential Disproportionate High and Adverse Effect*
36 *on Minority and Low-Income Populations in the Upper Sacramento River Area*
37 Communities in the upper Sacramento River portion of the primary study area
38 would remain below minority and low-income thresholds for environmental
39 justice. The No-Action Alternative would not cause long-term operational
40 changes; therefore, communities adjacent to the Sacramento River would not be
41 affected by long-term changes to environmental and recreational conditions.
42 Construction-related gains within this area would not be realized. Existing
43 adverse effects on minority or low-income populations would not be

1 disproportionately high and adverse. No disproportionately high and adverse
2 effects on minority or low-income populations would occur.

3 Tehama County would maintain its steady population growth under the No-
4 Action Alternative. Between 1990 and 2010, the population increased by 27.2
5 percent, with total population projected to reach 68,769 by 2020 (DOF 2010).
6 The minority (nonwhite) population is projected to account for 31 percent of the
7 total population in Tehama County in 2020, an increase of nearly 7 percent from
8 the current 23.9 percent level, but less than the 62.5 percent minority population
9 projected statewide for 2020.

10 As described in Chapter 16, “Socioeconomics, Population, and Housing,”
11 during 2000 to 2010, the poverty level in Tehama County increased by 2.2
12 percent and unemployment rates in Tehama County fluctuated between 6.4 and
13 8.8 percent. Tehama County is similar to neighboring Shasta County in
14 employment and income trends, and dominant employment sectors. Projected
15 growth industries differ between the two counties, however; Tehama County is
16 projected to experience economic growth in construction and information
17 services (see Chapter 16, “Socioeconomics, Population, and Housing”). These
18 sectors are the third and fifth largest anticipated growth areas statewide.

19 Because the No-Action Alternative would not change existing or projected
20 future conditions, it would not have a disproportionately high or adverse effect
21 on minority or low-income communities. Mitigation is not required for the No-
22 Action Alternative.

23 **Lower Sacramento River and Delta**

24 *Impact EJ-4 (No-Action): Potential Disproportionate High and Adverse Effect*
25 *on Minority and Low-Income Populations in the Lower Sacramento River and*
26 *Delta Area* Some communities within the lower Sacramento River and Delta
27 portion of the extended study area contain minority and low-income populations
28 above environmental justice thresholds; however, continuing the existing and
29 projected future conditions under the No-Action Alternative would not affect
30 those populations. No disproportionately high and adverse effects on minority
31 or low-income populations would occur.

32 The lower Sacramento River and Delta portion of the extended study area
33 includes Butte, Colusa, Contra Costa, Glenn, Sacramento, San Joaquin, Solano,
34 Sutter, and Yolo counties. In 2010, the population of the nine-county region was
35 4,226,027. This number is expected to grow by 47.5 percent to 6,294,088 by
36 2020 (DOF 2010, 2012). The minority (nonwhite) population is projected to
37 account for 63.8 percent of the total population in the lower Sacramento River
38 and Delta area by 2020, with minority populations exceeding 50 percent in
39 Colusa, Sacramento, San Joaquin, Solano, Sutter, and Yolo counties. Although
40 the minority population in the lower Sacramento River and Delta area is
41 projected to exceed 50 percent by 2020, the 63.8 percent representation would

1 not be meaningfully greater than the statewide minority population, which is
2 projected to be 62.5 percent.

3 In 2010, poverty levels in the nine-county region ranged from 10 percent to 20
4 percent, with low-income populations exceeding the 15.5 percent statewide
5 poverty level in Butte, Glenn, Sacramento, San Joaquin, and Yolo counties
6 (U.S. Census Bureau 2009b). Employment and labor trends in the lower
7 Sacramento River and Delta portion of the extended study area are generally
8 consistent with statewide trends. In 2010, approximately 15.6 percent of the
9 labor force in the nine-county area was classified as unemployed, compared to a
10 statewide total of 7.7 percent. Butte, Colusa, Sacramento, San Joaquin, Solano,
11 and Sutter counties registered higher unemployment rates than the state as a
12 whole in 2010. Generally, the counties with the highest unemployment rates in
13 2010 were characterized by greater dependence on the agricultural industry and
14 less industrial diversity. Five of the six counties with unemployment rates above
15 the statewide average maintained more than 60 percent of their land mass in
16 agricultural production. Unemployment rates tend to be higher in rural areas
17 than in urban areas because farm work is typically seasonal or temporary.

18 The lower Sacramento River and Delta portion of the extended study area has
19 some low-income populations and some counties with a higher unemployment
20 rate than the statewide average. However, the No-Action Alternative would not
21 change the existing or projected future conditions. Therefore, the No-Action
22 Alternative would not have disproportionately high and adverse effects on
23 minority or low-income populations. Mitigation is not required for the No-
24 Action Alternative.

25 **CVP/SWP Service Areas**

26 *Impact EJ-5 (No-Action): Potential Disproportionate High and Adverse Effect* 27 *on Minority and Low-Income Populations in the CVP/SWP Service Areas*

28 Some communities within the CVP and SWP service areas contain minority and
29 low-income populations above environmental justice thresholds; however,
30 adverse effects on CVP and SWP customers within these communities do not
31 constitute a disproportionately high and adverse impact. Continuing the existing
32 and projected future conditions under the No-Action Alternative would not
33 affect these populations. No disproportionately high and adverse effects on
34 minority or low-income populations would occur.

35 The CVP and SWP service areas are so expansive that they may be considered
36 synonymous with the entire state of California for environmental justice
37 purposes. Together, the CVP and SWP service areas include 36 of California's
38 58 counties, accounting for 91 percent (39 million residents) of California's
39 population in 2010. The state's population has increased by almost 30 percent
40 since 1990 and is projected to increase by approximately 32 percent to more
41 than 51 million people by 2020 (DOF 2010). Continued ethnic diversification is
42 expected. Minority groups have been steadily increasing their proportion of the
43 state population. The population of individuals in California identifying

1 themselves as Asian–Pacific Islander or multiracial experienced double-digit
2 population growth, while those identifying themselves as Black or African
3 American experienced the least amount of growth between 2000 and 2010 (U.S.
4 Census Bureau 2010b). Hispanics are the most numerous minority group in
5 California, and many members of this ethnic group work on farms that receive
6 some or all of their water from the CVP. In general, rural agricultural counties
7 have smaller minority populations than urban counties.

8 Poverty levels for both individuals and children in California increased slightly
9 between 2000 and 2010. The percentage of people below the poverty level in
10 Shasta County is expected to follow national and statewide economic trends.
11 Generally, poverty rates tend to be higher in rural counties than in urban
12 counties. Despite these overall differences, each of the state’s major urban areas
13 has pockets of low-income neighborhoods with high poverty rates.

14 California’s total labor force increased just over 2 percent from 2002 to 2005,
15 adding between 100,000 and 200,000 individuals each year. Between 2004 and
16 2005, the labor force increased by approximately 188,000 individuals. This was
17 the largest annual increase over the 4-year period. California’s total labor force
18 exceeded 18.8 million in 2010. The state’s unemployment rate was lowest in
19 2000 (5.0 percent), and has been increasing since 2003. Unemployment in 2010
20 registered at 7.7 percent, greater than the state’s 2001 unemployment rate of 5.4.
21 This observed increase in the unemployment rate at the state level has coincided
22 with similar national employment trends. Like poverty, unemployment rates
23 tend to be lower in urban areas than in rural areas of the state; however, high
24 unemployment rates are often found in low-income neighborhoods of major
25 urban centers.

26 Although the CVP and SWP service areas have some low-income populations,
27 the No-Action Alternative would not change the existing or projected future
28 conditions. Therefore, no disproportionately high and adverse effects on
29 minority or low-income populations would occur. Mitigation is not required for
30 the No-Action Alternative.

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

33 ***Shasta Lake and Vicinity***

34 ***Impact EJ-1 (CP1): Potential Disproportionate High and Adverse Effect on***
35 ***Minority and Low-Income Populations in the Vicinity of Shasta Lake***

36 Communities adjacent to the project construction site may experience
37 temporary or short-term adverse environmental effects because of construction
38 activities and changes in project conditions and operations. However, neither
39 construction-related nor operational effects would disproportionately affect
40 minority or low-income populations in the vicinity of Shasta Lake. Increased
41 employment and income opportunities could also result from project
42 construction activities, and would not be disproportionately distributed among

1 minority and low-income populations. No disproportionately high and adverse
2 effects on minority or low-income populations would occur.

3 Under this alternative, the dam would be raised by 6.5 feet over a 54-month
4 construction period. Residents near Shasta Dam, as well as others who may
5 commute or otherwise travel near construction sites, would be exposed to a
6 range of potentially adverse environmental and public health effects over a 54-
7 month construction period (see Engineering Appendix). Temporary and/or
8 short-term adverse noise, visual, and air quality effects could result; in addition,
9 motorists could be delayed, and access to recreation opportunities or local
10 businesses could be temporarily reduced. Negative health effects could also
11 result if hazardous materials were to be accidentally released into the
12 environment during construction.

13 Nonwhite individuals, including the Winnemem Wintu Tribe and other Native
14 Americans, accounted for 16.6 percent of Shasta County's total population in
15 2010, well below the 50 percent threshold for a minority population. This
16 percentage is also substantially less than the 2010 statewide nonwhite
17 population of 42.4 percent. Likewise, the poverty rate in Shasta County was
18 17.7 percent in 2010, well below the 50 percent threshold and slightly greater
19 than the 15.5 percent statewide poverty rate. Therefore, the percentages of
20 minority and low-income individuals in populations in Shasta County are well
21 below threshold levels for a minority or low-income population. Therefore,
22 minority and low-income populations would not be disproportionately affected
23 by these adverse effects.

24 Increased employment and income opportunities may result from construction
25 under CP1, which could benefit minority and low-income populations. Project
26 construction under CP1 could increase the number of jobs available, or could
27 improve business conditions and incomes for workers who are already
28 employed by businesses that would directly or indirectly benefit from project-
29 related construction spending. The project would require a labor force of 300
30 people drawn directly from the Shasta Lake area. Most (85 percent) of the
31 construction materials and supplies would be purchased in the vicinity; these
32 materials and supplies would constitute 60 percent of total construction costs.
33 As described above, the percentages of minority and low-income individuals in
34 Shasta County populations are well below threshold levels for minority and
35 low-income populations, and employment effects would not be
36 disproportionately distributed among these groups. Selected minority and low-
37 income individuals may be potentially affected. Such economic and job-related
38 impacts would be beneficial. Mitigation for this impact is not needed, and thus
39 not proposed.

40 *Impact EJ-2 (CP1): Potential Disproportionate High and Adverse Effect on*
41 *Native American Populations from Disturbance or Loss of Sacred Locations in*
42 *the Vicinity of Shasta Lake* The local Native American community has
43 identified several locations in the vicinity of Shasta Lake that they consider to

1 be sacred. Notable among these locations are the Winnemem Wintu’s Puberty
2 Rock and the doctoring pools near Nawtawaket Creek and the Pit River Madesi
3 Band’s ethnographic villages, associated burial grounds, and several TCPs. CP1
4 would have a substantial adverse effect on several of these locations in the
5 vicinity of Shasta Lake. Because the Winnemem Wintu and Pit River Madesi
6 Band members attach religious and cultural significance to these locations, the
7 disturbance or loss of resources associated with these locations would result in a
8 disproportionately high and adverse effect on Native American populations in
9 the vicinity of Shasta Lake.

10 Two tribes, the Winnemem Wintu and the Pit River Madesi Band, live within
11 the vicinity of Shasta Lake, where they continue to actively practice many
12 aspects of their traditional culture. Both groups have related that a complex
13 cultural landscape of village sites, ceremonial areas, sacred sites, burial sites,
14 and resource areas would be affected directly by CP1.

15 Two particularly important Winnemem Wintu locations that would be affected
16 by CP1 are Puberty Rock and the doctoring pools near Nawtawaket Creek. CP1
17 could submerge Puberty Rock for longer periods, restricting the Winnemen
18 Wintu from holding the puberty ceremony at this important location. Relocating
19 the rock to higher ground is not possible; in the Winnemem Wintu’s worldview,
20 its location is preordained and connected with the nearby “two sisters”
21 mountain (Bolliboka Mountain). Puberty Rock also marks the location of an
22 extensive village with housepits and burials, situated at Kabyai Creek, west of
23 the McCloud River near the McCloud Campground. CP1 would inundate
24 additional burials at this location, which would require removal and relocation.
25 The Winnemem Wintu have estimated that 120 ancestral villages are still
26 accessible above the current high-water line of Shasta Lake and would be
27 adversely affected by CP1.

28 Pit River Madesi Band members state that 22 ethnographic villages, associated
29 burial grounds, and several TCPs are located within the existing reservoir and
30 proposed inundation or fluctuation areas.

31 Winnemem Wintu and Pit River Madesi Band members attach religious and
32 cultural significance to several locations in the vicinity of Shasta Lake;
33 therefore, the disturbance and loss of resources associated with these locations
34 would result in a disproportionately high and adverse effect on Native American
35 populations in the vicinity of Shasta Lake. Mitigation for this impact is not
36 proposed because no feasible mitigation (or action alternative) is available to
37 avoid or minimize the high and adverse effect. However, Reclamation is
38 committed to and will comply with the Federal NHPA Section 106 consultation
39 process to avoid, minimize, or mitigate any significant, adverse impacts to
40 cultural resources and historic properties due to CP1, to the extent possible.
41 Additional information on cultural resources mitigation is located in Chapter 14,
42 “Cultural Resources.”

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

2 *Impact EJ-3 (CP1): Potential Disproportionate High and Adverse Effect on*
3 *Minority and Low-Income Populations in the Upper Sacramento River Area*

4 Effects from project-related construction are not anticipated in the upper
5 Sacramento River area downstream from Shasta Dam. In the long term,
6 operational changes resulting from CP1 could reduce the risk of flooding and
7 enhance environmental and recreational conditions in this area. These
8 operational effects would not constitute a disproportionately high and adverse
9 impact on minority and low-income populations. No disproportionately high
10 and adverse effects on minority or low-income populations would occur.

11 In Tehama County, nonwhite individuals accounted for 18.0 percent of the total
12 population in 2010. This is roughly half of the 50 percent threshold for a
13 minority population. This level also is substantially less than the statewide
14 nonwhite population of 42.4 percent. The poverty level in Tehama County was
15 19.5 percent in 2010, also well below the 50 percent threshold and slightly
16 higher than the 15.5 percent statewide poverty rate. From 2000 to 2010, poverty
17 levels in Tehama County increase at a rate of 2.2 percent, outpacing the
18 statewide poverty rate (1.3 percent) by 0.9 percent over approximately the same
19 time. Based on this trend, and the comparatively consistent poverty rates
20 between Tehama County and the statewide population, poverty levels in
21 Tehama County are not meaningfully greater than poverty levels statewide.
22 Therefore, the percentages of minority and low-income individuals in
23 populations in Tehama County are well below threshold levels for minority and
24 low-income populations. Thus, disproportionately high and adverse effects on
25 minority or low-income populations would not occur.

26 Communities along the upper Sacramento River portion of the primary study area
27 would not be exposed to direct construction-related impacts associated with CP1.

28 Raising Shasta Dam would add 256,000 acre-feet of cold-water storage to the
29 overall capacity of the reservoir. This operational change would be beneficial
30 for two reasons. CP1 would reduce the risk of flooding downstream from Shasta
31 Dam and consequently reduce potentially adverse social, economic, and
32 environmental effects because of flooding for property owners, businesses, and
33 workers. In addition, CP1 would improve environmental and recreational
34 conditions by enhancing habitat for fish and wildlife, benefiting anglers,
35 hunters, and wildlife viewers.

36 These beneficial impacts would not be disproportionately distributed among
37 minority and low-income populations, because representation of these groups in
38 the population of Tehama County is well below threshold levels. Selected
39 minority and low-income individuals may be potentially affected; however,
40 these environmental and recreational effects would be beneficial. Mitigation for
41 this impact is not needed, and thus not proposed.

1 **Lower Sacramento River and Delta**

2 *Impact EJ-4 (CP1): Potential Disproportionate High and Adverse Effect on*
3 *Minority and Low-Income Populations in the Lower Sacramento River and*
4 *Delta Area* Operational effects of CP1 would be similar to those described for
5 the upper Sacramento River portion of the primary study area under Impact EJ-
6 2 (CP1). However, because the beneficial effects (reduction of flooding risk and
7 improved environmental and recreational conditions) would diminish with
8 distance from the project site, the benefits in this area would be less. No
9 disproportionately high or adverse effects on minority or low-income
10 populations would occur.

11 Operational effects of CP1 on minority and low-income populations in the
12 lower Sacramento River and Delta portion of the extended study area would be
13 similar to those described for the upper Sacramento River portion of the primary
14 study area under Impact EJ-2 (CP1). However, benefits in the lower Sacramento
15 River and Delta area resulting from the reduced risk of flooding and improved
16 environmental and recreational conditions would be less than described for the
17 upper Sacramento River area because the lower Sacramento River and Delta is
18 located at a greater distance from the project site. Minority and low-income
19 populations would not be disproportionately affected. No disproportionately
20 high or adverse effects on minority or low-income populations would occur.
21 Mitigation for this impact is not needed, and thus not proposed.

22 **CVP/SWP Service Areas**

23 *Impact EJ-5 (CP1): Potential Disproportionate High and Adverse Effect on*
24 *Minority and Low-Income Populations in the CVP/SWP Service Areas* Direct
25 construction-related impacts are not anticipated in the CVP and SWP service
26 areas. The project could result in adverse indirect impacts because of water and
27 power rate increases for customers within the CVP and SWP service areas.
28 Employment opportunities and personal incomes may increase because of
29 operational changes that improve the reliability of the water supply and power
30 for businesses and others. Minority and low-income populations would not be
31 disproportionately affected. No disproportionately high and adverse effects on
32 minority or low-income populations would occur.

33 Utility customers in communities within the CVP and SWP service areas may
34 experience indirect, adverse effects through rate increases as a result of CP1.
35 Project-related water storage and hydroelectric facility improvements may be
36 funded partly through increased rates for water and power services. However,
37 such adverse effects would not disproportionately affect minority or low-
38 income populations.

39 Operational changes resulting from CP1 may increase employment
40 opportunities and water and power reliability in the CVP and SWP
41 communities, which would be beneficial for individual utility customers and
42 businesses. Selected minority and low-income individuals may be beneficially
43 affected by increased employment opportunities. Such beneficial employment-

1 related impacts would not disproportionately affect minority and low-income
2 populations. Thus, no disproportionately high and adverse effects on minority or
3 low-income populations would occur. Mitigation for this impact is not needed,
4 and thus not proposed.

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

7 **Shasta Lake and Vicinity**

8 *Impact EJ-1 (CP2): Potential Disproportionate High and Adverse Effect on*
9 *Minority and Low-Income Populations in the Vicinity of Shasta Lake*

10 Communities adjacent to the project construction site may experience
11 temporary and/or short-term adverse environmental effects because of
12 construction activities and changes in project conditions and operations.
13 However, neither construction-related nor operational effects would
14 disproportionately affect minority or low-income populations in the vicinity of
15 Shasta Lake. Therefore, no disproportionately high and adverse effects on
16 minority or low-income populations would occur.

17 Effects on minority and low-income populations would be similar to those
18 described above for Impact EJ-1 (CP1), except that the dam would be raised by
19 12.5 feet and the construction period likely would extend for up to 6 additional
20 months. The beneficial effects and less-than-significant adverse impacts would
21 be similar to those described under Impact EJ-1 (CP1) because the types of
22 work and the predicted workforce would be similar under each alternative. As
23 described under Impact EJ-1 (CP1), the percentages of minority and low-
24 income individuals in populations in Shasta County are well below threshold
25 levels for a minority or low-income population. Therefore, disproportionately
26 high and adverse effects on minority or low-income populations would not
27 occur. Mitigation for this impact is not needed, and thus not proposed.

28 *Impact EJ-2 (CP2): Potential Disproportionate High and Adverse Effect on*
29 *Native American Populations from Disturbance or Loss of Sacred Locations in*
30 *the Vicinity of Shasta Lake* The local Native American community has
31 identified several locations in the vicinity of Shasta Lake that they consider to
32 be sacred. Notable among these locations are the Winnemem Wintu's Puberty
33 Rock and the doctoring pools near Nawtawaket Creek and the Pit River Madesi
34 Band's ethnographic villages, associated burial grounds, and several TCPs. CP2
35 would have a substantial adverse effect on several of these locations in the
36 vicinity of Shasta Lake. Because the Winnemem Wintu and Pit River Madesi
37 Band members attach religious and cultural significance to these locations, the
38 disturbance or loss of resources associated with these locations would result in a
39 disproportionately high and adverse effect on Native American populations in
40 the vicinity of Shasta Lake.

41 This impact would be similar to but slightly greater than Impact EJ-2 (CP1)
42 because the inundation area under CP2 would be slightly greater than under
43 CP1. A disproportionately high and adverse effect on Native American

1 populations would occur. Mitigation for this impact is not proposed because no
2 feasible mitigation (or action alternative) is available to avoid or minimize the
3 high and adverse effect. However, Reclamation is committed to and will
4 comply with the Federal NHPA Section 106 consultation process to avoid,
5 minimize, or mitigate any significant, adverse impacts to cultural resources and
6 historic properties due to CP2, to the extent possible. Additional information on
7 cultural resources mitigation is located in Chapter 14, "Cultural Resources."

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

9 *Impact EJ-3 (CP2): Potential Disproportionate High and Adverse Effect on*
10 *Minority and Low-Income Populations in the Upper Sacramento River Area*

11 Effects from project-related construction are not anticipated in the upper
12 Sacramento River area downstream from Shasta Dam. In the long term,
13 operational changes resulting from CP2 could reduce the risk of flooding and
14 enhance environmental and recreational conditions in this area. These
15 operational effects would not constitute a disproportionately high and adverse
16 impact on minority and low-income populations. No disproportionately high
17 and adverse effects on minority or low-income populations would occur.

18 This impact would be similar to Impact EJ-3 (CP1). CP2 would provide
19 187,000 acre-feet more cold-water storage capacity than CP1. Greater storage
20 capacity would reduce the risk of flooding and, along with increased cold water,
21 would benefit downstream fisheries and recreation resources and users. Also, as
22 described under Impact EJ-3 (CP1), the percentages of minority and low-
23 income individuals in populations in Tehama County are well below threshold
24 levels for minority and low-income populations. Thus, disproportionately high
25 and adverse effects on minority or low-income populations would not occur.
26 Mitigation for this impact is not needed, and thus not proposed.

27 **Lower Sacramento River and Delta**

28 *Impact EJ-4 (CP2): Potential Disproportionate High and Adverse Effect on*
29 *Minority and Low-Income Populations in the Lower Sacramento River and*

30 *Delta Area* Operational effects of CP2 would be similar to those described for
31 the upper Sacramento River portion of the primary study area under Impact EJ-
32 4 (CP2). However, because the beneficial effects (reduction of flooding risk and
33 improved environmental and recreational conditions) would diminish with
34 distance from the project site, the benefits in this area would be less. No
35 disproportionately high or adverse effects on minority or low-income
36 populations would occur.

37 This impact would be similar to Impact EJ-4 (CP1). Under CP2, reduced
38 flooding and beneficial effects on fisheries and recreation resources also would
39 occur in the lower Sacramento River and Delta portion of the extended study
40 area. However, the beneficial effects would be less than along the upper
41 Sacramento River because benefits would diminish with increasing distance
42 from the project site. As in the upper Sacramento River portion of the primary
43 study area, the additional 187,000 acre-feet of reservoir storage would provide

1 somewhat greater benefits under CP2 than under CP1. Minority and low-
2 income populations would not be disproportionately affected. No
3 disproportionately high or adverse effects on minority or low-income
4 populations would occur. Mitigation for this impact is not needed, and thus not
5 proposed.

6 **CVP/SWP Service Areas**

7 *Impact EJ-5 (CP2): Potential Disproportionate High and Adverse Effect on*
8 *Minority and Low-Income Populations in the CVP/SWP Service Areas* Direct
9 construction-related impacts are not anticipated in the CVP and SWP service
10 areas. The project could result in adverse indirect impacts because of water and
11 power rate increases for customers within the CVP and SWP service areas.
12 Employment opportunities and personal incomes may increase because of
13 operational changes that improve the reliability of the water supply and power
14 for businesses and others. Minority and low-income populations would not be
15 disproportionately affected. No disproportionately high and adverse effects on
16 minority or low-income populations would occur.

17 This impact would be similar to Impact EJ-5 (CP1). Construction costs under
18 CP2 would be greater than under CP1, because of the increased need for
19 construction materials and an additional 6 months of construction. These
20 increased costs would result in slightly greater increases in water and power
21 rates than under CP1. However, such adverse effects would not
22 disproportionately affect minority and low-income populations. Operational
23 benefits would be similar to those of CP1, and minority or low-income
24 populations would not be disproportionately affected. Therefore, no
25 disproportionately high and adverse effects on minority or low-income
26 populations would occur. Mitigation for this impact is not needed, and thus not
27 proposed.

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

31 *Impact EJ-1 (CP3): Potential Disproportionate High and Adverse Effect on*
32 *Minority and Low-Income Populations in the Vicinity of Shasta Lake*
33 Communities adjacent to the project construction site may experience
34 temporary and/or short-term adverse environmental effects because of
35 construction activities and changes in project conditions and operations.
36 However, neither construction-related nor operational effects would
37 disproportionately affect minority or low-income populations in the vicinity of
38 Shasta Lake. No disproportionately high or adverse effects on minority or low-
39 income populations would occur.

40 This impact would be similar to Impact EJ-1 (CP1). Under CP3, the effects on
41 minority and low-income populations would be similar to those described above
42 for Impact EJ-1 (CP1), except that the dam would be raised by 18.5 feet and the
43 construction period would extend for at least 6 additional months and require an

1 additional 50 construction workers. The beneficial impacts and less-than-
2 significant adverse impacts would be similar to those described under CP1
3 because the types of work and the predicted workforce would be similar under
4 each alternative. As described under Impact EJ-1 (CP1), the percentages of
5 minority and low-income individuals in populations in Shasta County are well
6 below threshold levels for a minority or low-income population. Therefore,
7 disproportionately high effects on minority or low-income populations would
8 not occur (nor would disproportionately high and beneficial effects). Mitigation
9 for this impact is not needed, and thus not proposed.

10 *Impact EJ-2 (CP3): Potential Disproportionate High and Adverse Effect on*
11 *Native American Populations from Disturbance or Loss of Sacred Locations in*
12 *the Vicinity of Shasta Lake* The local Native American community has
13 identified several locations in the vicinity of Shasta Lake that they consider to
14 be sacred. Notable among these locations are the Winnemem Wintu's Puberty
15 Rock and the doctoring pools near Nawtawaket Creek and the Pit River Madesi
16 Band's ethnographic villages, associated burial grounds, and several TCPs. CP3
17 would have a substantial adverse effect on several of these locations in the
18 vicinity of Shasta Lake. Because the Winnemem Wintu and Pit River Madesi
19 Band members attach religious and cultural significance to these locations, the
20 disturbance or loss of resources associated with these locations would result in a
21 disproportionately high and adverse effect on Native American populations in
22 the vicinity of Shasta Lake.

23 This impact would be similar to but slightly greater than Impact EJ-2 (CP2)
24 because the inundation area under CP3 would be slightly greater than under
25 CP2. A disproportionately high and adverse effect on Native American
26 populations would occur. Mitigation for this impact is not proposed because no
27 feasible mitigation (or action alternative) is available to avoid or minimize the
28 high and adverse effect. However, Reclamation is committed to and will
29 comply with the Federal NHPA Section 106 consultation process to avoid,
30 minimize, or mitigate any significant, adverse impacts to cultural resources and
31 historic properties due to CP3, to the extent possible. Additional information on
32 cultural resources mitigation is located in Chapter 14, "Cultural Resources."

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

34 *Impact EJ-3 (CP3): Potential Disproportionate High and Adverse Effect on*
35 *Minority and Low- Income Populations in the Upper Sacramento River Area*
36 Effects from project-related construction are not anticipated in the upper
37 Sacramento River area downstream from Shasta Dam. In the long term,
38 operational changes resulting from CP3 could reduce the risk of flooding and
39 enhance environmental and recreational conditions in this area. These beneficial
40 operational effects would not be disproportionately distributed among minority
41 and low-income populations. No disproportionately high and adverse effects on
42 minority or low-income populations would occur.

1 This impact would be similar to Impact EJ-3 (CP1). CP3 would provide
2 378,000 acre-feet more cold-water storage capacity than CP1. Greater storage
3 capacity would reduce the risk of flooding and, along with increased cold water,
4 would benefit downstream fisheries and recreation resources and users. Also, as
5 described under Impact EJ-3 (CP1), the percentages of minority and low-
6 income individuals in populations in Tehama County are well below threshold
7 levels for minority and low-income populations. Thus, disproportionately high
8 and adverse effects on minority or low-income populations would not occur.
9 Mitigation for this impact is not needed, and thus not proposed.

10 **Lower Sacramento River and Delta**

11 *Impact EJ-4 (CP3): Potential Disproportionate High and Adverse Effect on*
12 *Minority and Low-Income Populations in the Lower Sacramento River and*
13 *Delta Area* Operational effects of CP3 would be similar to those described for
14 the upper Sacramento River portion of the primary study area under Impact EJ-
15 3 (CP3). However, because the beneficial effects (reduction of flooding risk and
16 improved environmental and recreational conditions) would diminish with
17 distance from the project site, the benefits in this area would be less. No
18 disproportionately high or adverse effects on minority or low-income
19 populations would occur.

20 This impact would be similar to Impact EJ-4 (CP1). Under CP3, reduced
21 flooding and beneficial effects on fisheries and recreation resources also would
22 occur in the lower Sacramento River and Delta portion of the extended study
23 area. However, the beneficial effects would be less than along the upper
24 Sacramento River because benefits would diminish with increasing distance
25 from the project site. As in the upper Sacramento River portion of the primary
26 study area, the additional 378,000 acre-feet of reservoir storage would provide
27 somewhat greater benefits under CP3 than under CP1. Minority and low-
28 income populations would not be disproportionately affected. No
29 disproportionately high or adverse effects on minority or low-income
30 populations would occur. Mitigation for this impact is not needed, and thus not
31 proposed.

32 **CVP/SWP Service Areas**

33 *Impact EJ-5 (CP3): Potential Disproportionate High and Adverse Effect on*
34 *Minority and Low-Income Populations in the CVP/SWP Service Areas* Direct
35 construction-related impacts are not anticipated in the CVP and SWP service
36 areas. The project could result in adverse indirect impacts because of water and
37 power rate increases for customers within the CVP and SWP service areas.
38 Employment opportunities and personal incomes may increase because of
39 operational changes that improve the reliability of the water supply reliability
40 and power for businesses and others. Minority and low-income populations
41 would not be disproportionately affected. No disproportionately high or adverse
42 effects on minority or low-income populations would occur.

1 This impact would be similar to Impact EJ-5 (CP1). Construction costs under
2 CP3 would be greater than under CP1 because of the increased need for
3 construction materials and an additional 6 months of construction. These
4 increased costs would result in slightly greater increases in water and power
5 rates than under CP1. However, such adverse effects would not
6 disproportionately affect minority and low-income populations. Operational
7 benefits would be similar to those of CP1, and minority and low-income
8 populations would not be disproportionately affected. Therefore, no
9 disproportionately high and adverse effects on minority or low-income
10 populations would occur. Mitigation for this impact is not needed, and thus not
11 proposed.

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

14 **Shasta Lake and Vicinity**

15 *Impact EJ-1 (CP4): Potential Disproportionate High and Adverse Effect on*
16 *Minority and Low-Income Populations in the Vicinity of Shasta Lake*

17 Communities adjacent to the project construction site may experience
18 temporary and/or short-term adverse environmental effects because of
19 construction activities and changes in project conditions and operations.
20 However, neither construction-related nor operational effects would be
21 disproportionately distributed among minority or low-income populations in the
22 vicinity of Shasta Lake. No disproportionately high and adverse effects on
23 minority or low-income populations would occur.

24 This impact would be similar to Impact EJ-1 (CP1). Under CP4, the effects on
25 minority and low-income populations would be similar to those described above
26 for Impact EJ-1 (CP1), except that the dam would be raised by 18.5 feet and the
27 construction period would extend for at least 6 additional months and require an
28 additional 50 construction workers. The beneficial effects and less-than-
29 significant adverse impacts would be similar to those described under CP1
30 because the types of work and the predicted workforce would be similar under
31 each alternative. As described under Impact EJ-1 (CP1), the percentages of
32 minority and low-income individuals in populations in Shasta County are well
33 below threshold levels for a minority or low-income population. Therefore,
34 adverse and beneficial effects would not be disproportionately distributed
35 among minority or low-income populations. No disproportionately high and
36 adverse effects on minority or low-income populations would occur. Mitigation
37 for this impact is not needed, and thus not proposed.

38 *Impact EJ-2 (CP4): Potential Disproportionate High and Adverse Effect on*
39 *Native American Populations from Disturbance or Loss of Sacred Locations in*
40 *the Vicinity of Shasta Lake* The local Native American community has
41 identified several locations in the vicinity of Shasta Lake that they consider to
42 be sacred. Notable among these locations are the Winnemem Wintu's Puberty
43 Rock and the doctoring pools near Nawtawaket Creek and the Pit River Madesi
44 Band's ethnographic villages, associated burial grounds, and several TCPs. CP4

1 would have a substantial adverse effect on several of these locations in the
2 vicinity of Shasta Lake. Because the Winnemem Wintu and Pit River Madesi
3 Band members attach religious and cultural significance to these locations, the
4 disturbance or loss of resources associated with these locations would result in a
5 disproportionately high and adverse effect on Native American populations in
6 the vicinity of Shasta Lake.

7 This impact would be similar to Impact EJ-2 (CP3), but the frequency and
8 timing of inundation may vary. Disproportionately high and adverse effects on
9 Native American populations would occur. Mitigation for this impact is not
10 proposed because no feasible mitigation is available. Mitigation for this impact
11 is not proposed because no feasible mitigation (or action alternative) is available
12 to avoid or minimize the high and adverse effect. However, Reclamation is
13 committed to and will comply with the Federal NHPA Section 106 consultation
14 process to avoid, minimize, or mitigate any significant, adverse impacts to
15 cultural resources and historic properties due to CP4, to the extent possible.
16 Additional information on cultural resources mitigation is located in Chapter 14,
17 “Cultural Resources.”

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

19 *Impact EJ-3 (CP4): Potential Disproportionate High and Adverse Effect on*
20 *Minority and Low-Income Populations in the Upper Sacramento River Area*

21 Effects from project-related construction are not anticipated in the upper
22 Sacramento River area downstream from Shasta Dam. In the long term,
23 operational changes resulting from CP4 could reduce the risk of flooding and
24 enhance environmental and recreational conditions in this area. These beneficial
25 operational effects would not constitute a disproportionately high and adverse
26 impact on minority and low-income populations. No disproportionately high
27 and adverse effects on minority or low-income populations would occur.

28 This impact would be similar to Impact EJ-3 (CP1). CP4 would provide
29 378,000 acre-feet more cold-water storage capacity than CP1. Greater storage
30 capacity would reduce the risk of flooding and, along with increased cold water,
31 would benefit downstream fisheries and recreation resources and users. Also, as
32 described under Impact EJ-3 (CP1), the percentages of minority and low-
33 income individuals in populations in Tehama County are well below threshold
34 levels for minority and low-income populations. Minority and low-income
35 populations would not be disproportionately affected. No disproportionately
36 high and adverse effects on minority or low-income populations would occur.
37 Mitigation for this impact is not needed, and thus not proposed.

38 **Lower Sacramento River and Delta**

39 *Impact EJ-4 (CP4): Potential Disproportionate High and Adverse Effect on*
40 *Minority and Low-Income Populations in the Lower Sacramento River and*

41 *Delta Area* Operational effects of CP4 would be similar to those described for
42 the upper Sacramento River portion of the primary study area under Impact EJ-
43 3 (CP4). However, because the beneficial effects (reduction of flooding risk and

1 improved environmental and recreational conditions) would diminish with
2 distance from the project site, the benefits in this area would be less. No
3 disproportionately high and adverse effects on minority or low-income
4 populations would occur.

5 This impact would be similar to Impact EJ-4 (CP1). Under CP4, reduced
6 flooding and beneficial effects on fisheries and recreation resources also would
7 occur in the lower Sacramento River and Delta portion of the extended study
8 area. However, the beneficial effects would be less than along the upper
9 Sacramento River because benefits would diminish with increasing distance
10 from the project site. As in the upper Sacramento River portion of the primary
11 study area, the additional 378,000 acre-feet of reservoir storage would provide
12 somewhat greater benefits under CP4 than under CP1. Minority and low-
13 income populations would not be disproportionately affected. No
14 disproportionately high or adverse effects on minority or low-income
15 populations would occur. Mitigation for this impact is not needed, and thus not
16 proposed.

17 **CVP/SWP Service Areas**

18 *Impact EJ-5 (CP4): Potential Disproportionate High and Adverse Effect on*
19 *Minority and Low-Income Populations in the CVP/SWP Service Areas* Direct
20 construction-related impacts are not anticipated in the CVP and SWP service
21 areas. The project could result in adverse indirect impacts because of water and
22 power rate increases for customers within the CVP and SWP service areas.
23 Employment opportunities and personal incomes may increase because of
24 operational changes that improve the reliability of the water supply and power
25 to businesses and others. Minority and low-income populations would not be
26 disproportionately affected. No disproportionately high and adverse effects on
27 minority or low-income populations would occur.

28 This impact would be similar to Impact EJ-5 (CP1). Construction costs under
29 CP4 would be greater than under CP1 because of the increased need for
30 construction materials and an additional 6 months of construction and require an
31 additional 50 construction workers. These increased costs would result in
32 slightly greater increases in water and power rates than under CP1. However,
33 such adverse effects would not disproportionately affect minority and low-
34 income populations. Operational benefits would be similar to those under CP1,
35 and minority and low-income populations would not be disproportionately
36 affected. Therefore, no disproportionately high and adverse effects on minority
37 or low-income populations would occur. Mitigation for this impact is not
38 needed, and thus not proposed.

39 **CP5 – 18.5-Foot Dam Raise, Combination Plan** 40 **Shasta Lake and Vicinity**

41 *Impact EJ-1 (CP5): Potential Disproportionate High and Adverse Effect on*
42 *Minority and Low-Income Populations in the Vicinity of Shasta Lake*
43 Communities adjacent to the project construction site may experience

1 temporary adverse environmental effects because of construction activities and
2 changes in project conditions and operations. However, the construction activity
3 in any specific area would be short-term, and neither construction-related nor
4 operational effects would constitute a high and adverse impact on minority or
5 low-income populations in the vicinity of Shasta Lake. No disproportionately
6 high and adverse effects on minority or low-income populations would occur.

7 This impact would be similar to Impact EJ-1 (CP1). Under CP5, the effects on
8 minority and low-income populations would be similar to those described above
9 for Impact EJ-1 (CP1), except that the dam would be raised by 18.5 feet and the
10 construction period would extend for at least 6 additional months and require an
11 additional 60 construction workers. The beneficial effects and less-than-
12 significant adverse impacts would be similar to those described under CP1
13 because the types of work and the predicted workforce would be similar under
14 each alternative. As described under Impact EJ-1 (CP1), the percentages of
15 minority and low-income individuals in populations in Shasta County are well
16 below threshold levels for a minority or low-income population. Therefore,
17 minority and low-income populations would not be disproportionately affected.
18 No disproportionately high and adverse effects on minority or low-income
19 populations would occur. Mitigation for this impact is not needed, and thus not
20 proposed.

21 *Impact EJ-2 (CP5): Potential Disproportionate High and Adverse Effect on*
22 *Native American Populations from Disturbance or Loss of Sacred Locations in*
23 *the Vicinity of Shasta Lake* The local Native American community has
24 identified several locations in the vicinity of Shasta Lake that they consider to
25 be sacred. Notable among these locations are the Winnemem Wintu's Puberty
26 Rock and the doctoring pools near Nawtawaket Creek and the Pit River Madesi
27 Band's ethnographic villages, associated burial grounds, and several TCPs. CP5
28 would have a substantial adverse effect on several of these locations in the
29 vicinity of Shasta Lake. Because Winnemem Wintu and Pit River Madesi Band
30 members attach religious and cultural significance to these locations, the
31 disturbance or loss of resources associated with these locations would result in a
32 disproportionately high and adverse effect on Native American populations in
33 the vicinity of Shasta Lake.

34 This impact would be the same as Impact EJ-2 (CP3). Disproportionately high
35 and adverse effects on Native American populations would occur. Mitigation
36 for this impact is not proposed because no feasible mitigation (or action
37 alternative) is available to avoid or minimize the high and adverse effect.
38 However, Reclamation is committed to and will comply with the Federal NHPA
39 Section 106 consultation process to avoid, minimize, or mitigate any significant,
40 adverse impacts to cultural resources and historic properties due to CP5, to the
41 extent possible. Additional information on cultural resources mitigation is
42 located in Chapter 14, "Cultural Resources."

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

2 *Impact EJ-3 (CP5): Potential Disproportionate High and Adverse Effect on*
3 *Minority and Low-Income Populations in the Upper Sacramento River Area*

4 Effects from project-related construction are not anticipated in the upper
5 Sacramento River area downstream from Shasta Dam. In the long term,
6 operational changes resulting from CP5 could reduce the risk of flooding and
7 enhance environmental and recreational conditions in this area. These
8 operational effects would not constitute a disproportionately high and adverse
9 impact on minority and low-income populations. No disproportionately high
10 and adverse effects on minority or low-income populations would occur.

11 This impact would be similar to Impact EJ-3 (CP1). CP5 would provide
12 378,000 acre-feet more cold-water storage capacity than CP1. Greater storage
13 capacity would reduce the risk of flooding and, along with increased cold water,
14 would benefit downstream fisheries and recreation resources and users. Also, as
15 described under Impact EJ-3 (CP1), the percentages of minority and low-
16 income individuals in populations in Tehama County are well below threshold
17 levels for minority and low-income populations. Therefore, minority and low-
18 income populations would not be disproportionately affected. No
19 disproportionately high and adverse effects on minority or low-income
20 populations would occur. Mitigation for this impact is not needed, and thus not
21 proposed.

22 **Lower Sacramento River and Delta**

23 *Impact EJ-4 (CP5): Potential Disproportionate High and Adverse Effect on*
24 *Minority and Low-Income Populations in the Lower Sacramento River and*
25 *Delta Area*

26 Operational effects of CP5 would be similar to those described for
27 the upper Sacramento River portion of the primary study area under Impact EJ-
28 3 (CP5). However, because the beneficial effects (reduction of flooding risk and
29 improved environmental and recreational conditions) would diminish with
30 distance from the project site, the benefits in this area would be less. No
31 disproportionately high and adverse effects on minority or low-income
 populations would occur.

32 This impact would be similar to Impact EJ-4 (CP1). Under CP5, reduced
33 flooding and beneficial effects on fisheries and recreation resources also would
34 occur in the lower Sacramento River and Delta portion of the extended study
35 area. However, the beneficial effects would be less than along the upper
36 Sacramento River because benefits would diminish with increasing distance
37 from the project site. As in the upper Sacramento River portion of the primary
38 study area, the additional 378,000 acre-feet of reservoir storage would provide
39 somewhat greater benefits under CP5 than under CP1. Minority and low-
40 income populations would not be disproportionately affected. No
41 disproportionately high or adverse effects on minority or low-income
42 populations would occur. Mitigation for this impact is not needed, and thus not
43 proposed.

1 **CVP/SWP Service Areas**

2 *Impact EJ-5 (CP5): Potential Disproportionate High and Adverse Effect on*
3 *Minority and Low-Income Populations in the CVP/SWP Service Areas* Direct
4 construction-related impacts are not anticipated in the CVP and SWP service
5 areas. The project could result in adverse indirect impacts because of water and
6 power rate increases for customers within the CVP and SWP service areas.
7 Employment opportunities and personal incomes may increase because of
8 operational changes that improve the reliability of the water supply and power
9 for businesses and others. Minority and low-income populations would not be
10 disproportionately affected. Therefore, no disproportionately high and adverse
11 effects on minority or low-income populations would occur.

12 This impact would be similar to Impact EJ-5 (CP1). Construction costs under
13 CP5 would be greater than under CP1 because of increased materials, an
14 additional 6 months of construction, and 60 additional construction workers.
15 These increased costs would result in slightly greater increases in water and
16 power rates than under CP1. However, such adverse effects would not
17 disproportionately affect minority and low-income populations. Operational
18 benefits would be similar to those under CP1, and minority and low-income
19 populations would not be disproportionately affected. Therefore, no
20 disproportionately high and adverse effects on minority or low-income
21 populations would occur. Mitigation for this impact is not needed, and thus not
22 proposed.

23 **24.3.5 Mitigation Measures**

24 Table 24-2 presents a summary of effects and mitigation measures for
25 environmental justice.

26 ***No-Action Alternative***

27 No mitigation measures are needed for this alternative.

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

30 No mitigation measures are needed for Impacts EJ-1 (CP1), EJ-3 (CP1), EJ-4
31 (CP1), or EJ-5 (CP1). No feasible mitigation is available for Impact EJ-2 (CP1).
32 The disturbance or loss of resources associated with locations considered by the
33 Winnemem Wintu and Pit River Madesi Band members to have religious and
34 cultural significance would result in an unmitigable disproportionately high and
35 adverse effect on Native American populations in the vicinity of Shasta Lake.

Table 24-2. Summary of Mitigation Measures for Environmental Justice

Impact		No-Action Alternative	CP1	CP2	CP3	CP4	CP5
Impact EJ-1: Potential Disproportionate High and Adverse Effect on Minority and Low-Income Populations in the Vicinity of Shasta Lake	Effect before Mitigation	NDHA	NDHA	NDHA	NDHA	NDHA	NDHA
	Mitigation Measure	None required.	None needed; thus, none proposed.				
	Effect after Mitigation	NDHA	NDHA	NDHA	NDHA	NDHA	NDHA
Impact EJ- Impact EJ-2: Potential Disproportionate High and Adverse Effect on Native American Populations in the Vicinity of Shasta Lake	Effect before Mitigation	NDHA	DHA	DHA	DHA	DHA	DHA
	Mitigation Measure	None required.	No feasible mitigation is available to reduce impact.				
	Effect after Mitigation	NDHA	DHA	DHA	DHA	DHA	DHA
Impact EJ- Impact EJ-3: Potential Disproportionate High and Adverse Effect on Minority and Low-Income Populations in the Upper Sacramento River Area	Effect before Mitigation	NDHA	NDHA	NDHA	NDHA	NDHA	NDHA
	Mitigation Measure	None required.	None needed; thus, none proposed.				
	Effect after Mitigation	NDHA	NDHA	NDHA	NDHA	NDHA	NDHA
Impact EJ- Impact EJ-4: Potential Disproportionate High and Adverse Effect on Minority and Low-Income Populations in the Lower Sacramento River and Delta Area	Effect before Mitigation	NDHA	NDHA	NDHA	NDHA	NDHA	NDHA
	Mitigation Measure	None required.	None needed; thus, none proposed.				
	Effect after Mitigation	NDHA	NDHA	NDHA	NDHA	NDHA	NDHA
Impact EJ- Impact EJ-5: Potential Disproportionate High and Adverse Effect on Minority and Low-Income Populations in the CVP/SWP Service Areas	Effect before Mitigation	NDHA	NDHA	NDHA	NDHA	NDHA	NDHA
	Mitigation Measure	None required.	None needed; thus, none proposed.				
	Effect after Mitigation	NDHA	NDHA	NDHA	NDHA	NDHA	NDHA

Key:

DHA = Disproportionately high and adverse

NDHA = Not disproportionately high and adverse

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

3 No mitigation measures are needed for Impacts EJ-1 (CP2), EJ-3 (CP2), EJ-4
4 (CP2), or EJ-5 (CP2). No feasible mitigation is available for Impact EJ-2 (CP2).
5 The disturbance or loss of resources associated with locations considered by the
6 Winnemem Wintu and Pit River Madesi Band members to have religious and
7 cultural significance would result in an unmitigable disproportionately high and
8 adverse effect on Native American populations in the vicinity of Shasta Lake.

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

10 No mitigation measures are needed for Impacts EJ-1 (CP3), EJ-3 (CP3), EJ-4
11 (CP3), or EJ-5 (CP3). No feasible mitigation is available for Impact EJ-2 (CP3).
12 The disturbance or loss of resources associated with locations considered by the
13 Winnemem Wintu and Pit River Madesi Band members to have religious and
14 cultural significance would result in an unmitigable disproportionately high and
15 adverse effect on Native American populations in the vicinity of Shasta Lake.

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

18 No mitigation measures are needed for Impacts EJ-1 (CP4), EJ-3 (CP4), EJ-4
19 (CP4), or EJ-5 (CP4). No feasible mitigation is available for Impact EJ-2 (CP4).
20 The disturbance or loss of resources associated with locations considered by the
21 Winnemem Wintu and Pit River Madesi Band members to have religious and
22 cultural significance would result in an unmitigable disproportionately high and
23 adverse effect on Native American populations in the vicinity of Shasta Lake.

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

25 No mitigation measures are needed for Impacts EJ-1 (CP5), EJ-3 (CP5), EJ-4
26 (CP5), or EJ-5 (CP5). No feasible mitigation is available for Impact EJ-2 (CP5).
27 The disturbance or loss of resources associated with locations considered by the
28 Winnemem Wintu and Pit River Madesi Band members to have religious and
29 cultural significance would result in an unmitigable disproportionately high and
30 adverse effect on Native American populations in the vicinity of Shasta Lake.

31 **24.3.6 Cumulative Effects**

32 In the primary study area (i.e., Shasta Lake and vicinity and the upper
33 Sacramento River from Shasta Dam to Red Bluff), minority and low-income
34 populations are not disproportionately represented. Identified construction
35 effects would be less than significant, and minority and low-income populations
36 would not be disproportionately affected.

37 Some communities within the extended study area (i.e., the lower Sacramento
38 River and Delta and the CVP and SWP service areas) exceed minority and low-
39 income thresholds. These communities, along with the general population,
40 would benefit from project effects that would reduce future water shortages by
41 improving water supply reliability for both average and drought years. The
42 greatest benefit would be provided by CP3, CP4, and CP5, which would

1 provide an additional 634,000 acre-feet of storage capacity. CP1 and CP2 would
2 provide only 256,000 and 443,000 acre-feet of increased storage capacity,
3 respectively, with correspondingly reduced benefits.

4 Alternatives that would incorporate the greatest increase to dam height would
5 result in the greatest project cost because of higher costs for construction
6 materials and longer construction periods. These increased costs may be
7 reflected in increased utility rates that could be combined with other utility rate
8 increases. Such rate increases would be incremental and would be experienced
9 by the general population, along with minority and low-income communities.

10 Therefore, the project would not contribute to disproportionate placement of
11 environmental impacts on low-income and minority populations or
12 communities, and no cumulatively considerable impacts would result.

13 The disturbance or loss of resources associated with locations considered by
14 Winnemem Wintu and Pit River Madesi Band members to have religious and
15 cultural significance would result in a disproportionately high and adverse effect
16 on Native American populations in the vicinity of Shasta Lake. Therefore, the
17 project would contribute to disproportionate placement of environmental
18 impacts on Native American populations and would result in a cumulatively
19 considerable incremental contribution to a significant and unavoidable
20 cumulative impact.

21

1 Chapter 25

2 Wild and Scenic River Considerations for

3 McCloud River

4 This chapter describes the effects of the dam and reservoir modifications
5 proposed under SLWRI action alternatives on the wild and scenic river values
6 of the lower McCloud River, one of the major tributaries to Shasta Lake.

7 This chapter differs from the other chapters in this DEIS in that it concerns only
8 the McCloud River and does not discuss other portions of the primary study
9 area nor the extended study area. The study area for this chapter consists of the
10 lower McCloud River from the McCloud River Bridge to the confluence with
11 Little Bollibokka Creek (Figure 25-1).

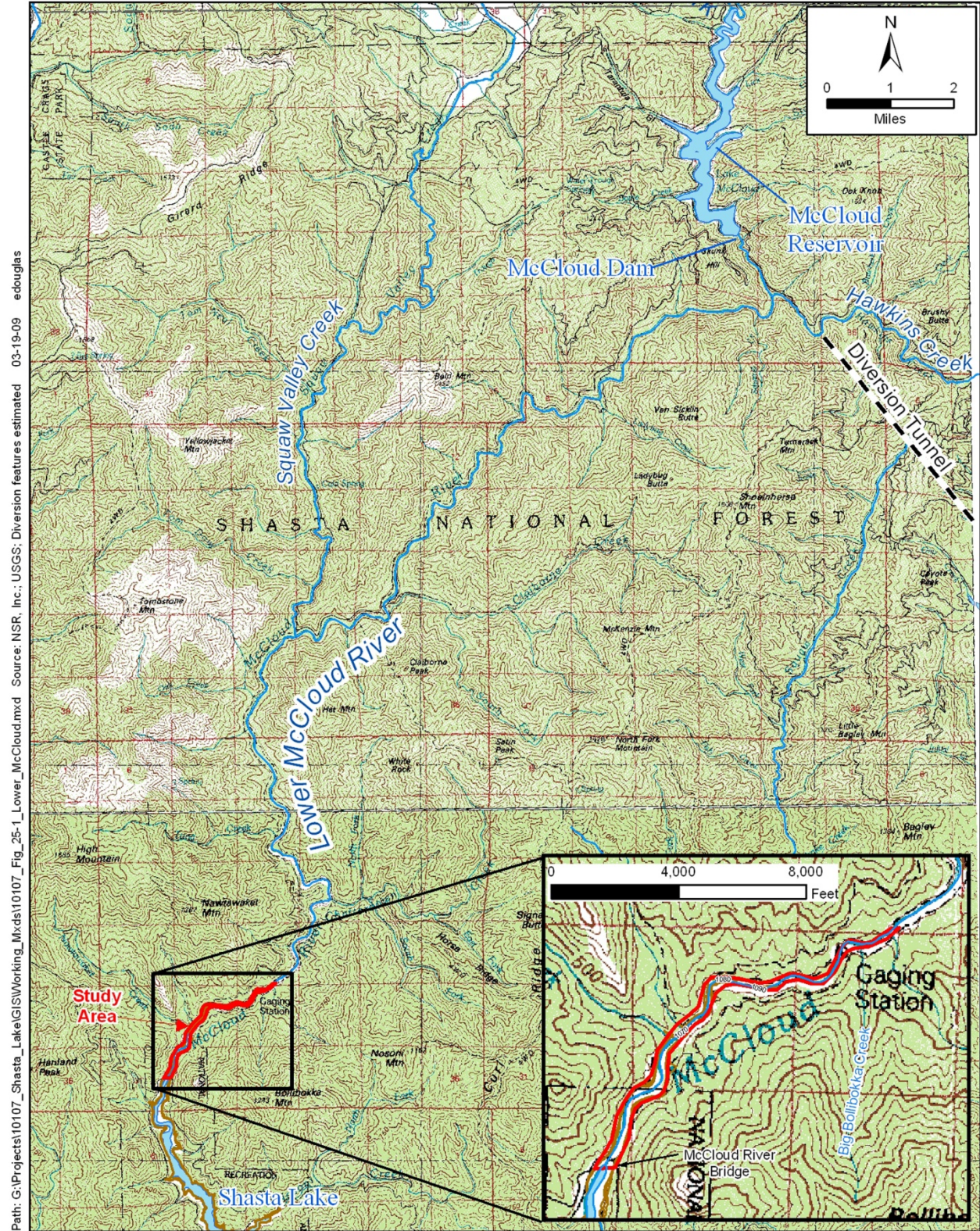
12 The primary focus of this chapter is the wild and scenic river values of the
13 lower McCloud River, particularly the reach that would periodically be newly
14 inundated if Shasta Dam and Shasta Lake were enlarged. The discussion and
15 analysis concentrate on the values for which the McCloud River has been
16 determined eligible for listing under the Federal Wild and Scenic Rivers Act
17 ((Federal WSRA); Public Law 90-542, as amended; 16 U.S. Code 1271-1287)
18 and for which a portion of the river is protected under the California Public
19 Resources Code, Section 5093.542 (State PRC). Section 5093.542 was
20 established through enactment of the California Wild and Scenic Rivers Act, as
21 amended (Sections 5093.50 – 5093.70).

22 This chapter also differs from the other chapters in that it first provides
23 background information and then discusses the regulatory framework to provide
24 context for the affected environment section.

25 25.1 Background

26 Segments of the McCloud River have been determined eligible for listing under
27 the Federal WSRA and are protected under the State PRC. The river has not
28 been formally listed as wild and scenic under either the Federal WSRA or State
29 PRC.

Shasta Lake Water Resources Investigation
 Environmental Impact Statement



1
 2 **Figure 25-1. Lower McCloud River Study Area**

1 The USFS evaluated the eligibility of the McCloud River for listing as wild and
2 scenic under the Federal WSRA during preparation of the Shasta-Trinity
3 National Forest (STNF) Land and Resource Management Plan (LRMP) in 1994
4 (USFS 1994). Although the LRMP found the McCloud River eligible for
5 listing, the LRMP direction was to not formally designate any reach of the river
6 as wild and scenic. Instead, the direction was to manage the lower McCloud
7 River under a Coordinated Resource Management Plan (CRMP; USFS 1995a).
8 The coordinated resource management plan (CRMP) is a coordinated effort
9 between landowners and stakeholders with a vested interest in the river. The
10 CRMP requires its signatories to protect the values that make it eligible for
11 Federal designation as wild and scenic and contains a provision stating that the
12 USFS reserves the right to pursue designation if the CRMP is terminated or fails
13 to protect these values.

14 The California Resources Agency (Resources Agency) evaluated the McCloud
15 River in the late 1980s (Jones & Stokes Associates 1988) to determine whether
16 it was eligible for listing under the State PRC. The Resources Agency study
17 found it eligible, but the California legislature declined to add the river to the
18 California wild and scenic river system. The legislature instead passed an
19 amendment to the California Wild and Scenic Rivers Act to protect the river's
20 free-flowing condition and the river's fishery below McCloud Dam through the
21 State PRC.

22 As described in more detail under "Regulatory Framework," the State PRC and
23 Federal WSRA share several similar components: the establishment of a wild
24 and scenic rivers system; the purpose of protecting certain rivers in their "free-
25 flowing" condition; the identification of extraordinary or outstandingly
26 remarkable values (ORV) that make such rivers eligible for protection; a study
27 process and procedure for including rivers in the system; and classifications of
28 "wild," "scenic," and "recreational." Both the Federal WSRA and State PRC
29 prohibit new water impoundments on designated rivers, and both contain
30 directives to government agencies to use their powers to further the policies of
31 the legislation.

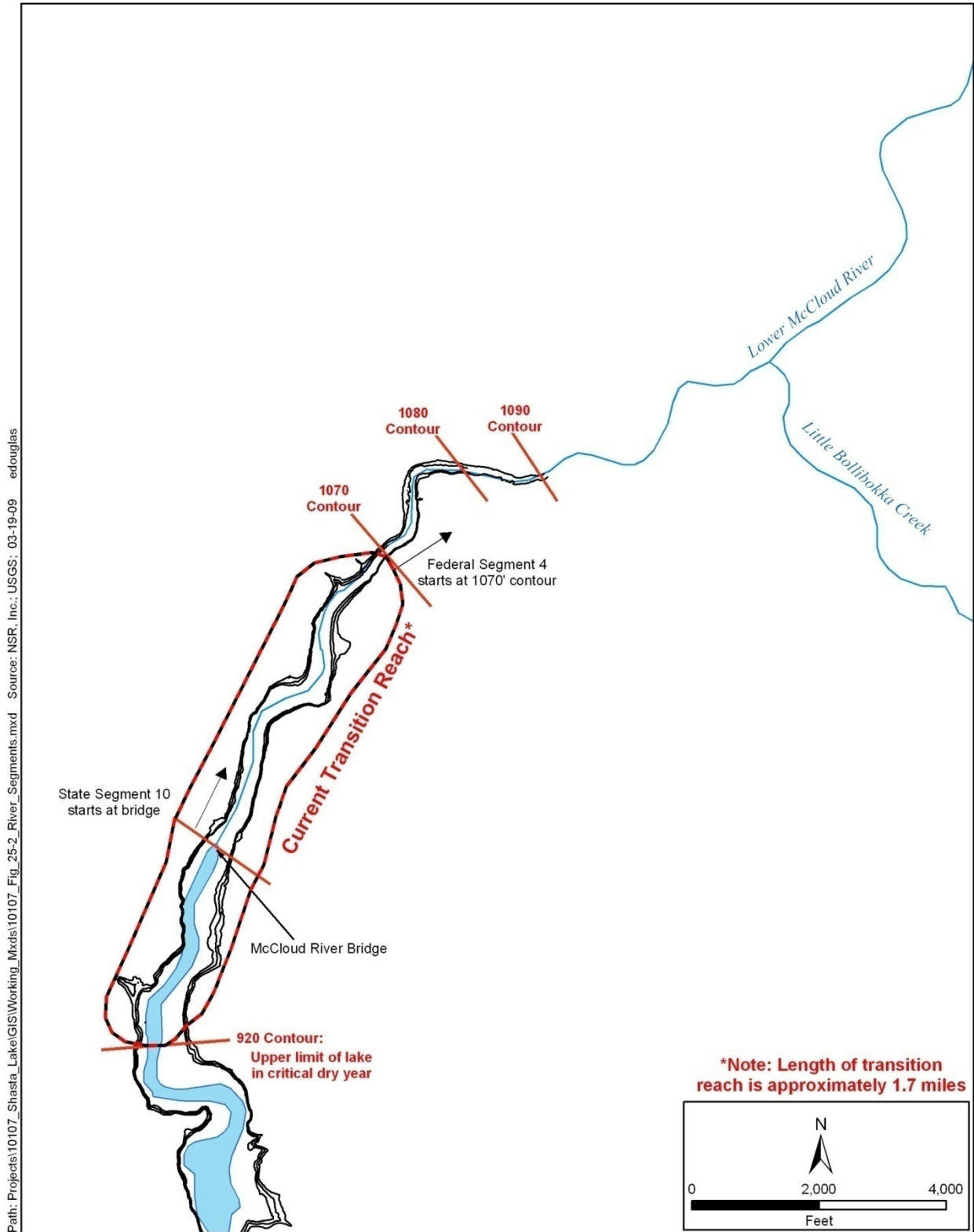
32 The Federal WSRA establishes a larger wild and scenic river corridor—
33 typically at least 0.25 mile on each side of the river—than the State PRC and
34 requires Federal agencies to manage the public lands in the corridor to protect
35 the river's free-flowing character and ORVs. In addition, the Federal agency
36 managing rivers that are Federally designated as wild and scenic is required to
37 develop and implement a management plan that will ensure the river's
38 protection. In contrast, the State PRC provides protection only to the first line of
39 permanent riparian vegetation and does not require a management plan.

40 The length of the lower McCloud River that was determined to be eligible for
41 wild and scenic river status differs between the Federal and State evaluations.
42 The USFS defined the lower McCloud River more narrowly than the Resources
43 Agency, considering the portion of the river that is currently periodically

1 inundated by Shasta Lake – referred to in this chapter as the *transition reach* –
2 as part of the lake rather than part of the river. The USFS defined the lower
3 river as extending from McCloud Dam downstream to an elevation of 1,070 feet
4 mean sea level (msl) (approximately 22 total river miles), which corresponds to
5 the current full-pool elevation of Shasta Lake. The Resources Agency’s study
6 report included approximately 5,400 feet of the transition reach (down to the
7 McCloud River Bridge) as part of the lower river’s segments (approximately 23
8 total river miles).

9 In its evaluation, the USFS divided the McCloud River into 10 segments
10 encompassing 46 total river miles: three segments along the upper McCloud
11 River (24 river miles above McCloud Reservoir) and seven segments along the
12 lower McCloud River (22 river miles below McCloud Dam). Numbering of the
13 upper McCloud River segments began at the headwaters and counted
14 downstream, but numbering of the lower McCloud River segments began at the
15 downstream extent and counted upstream. The USFS concluded that all 10
16 segments of the McCloud River were eligible for listing as a Federal wild and
17 scenic river because they are free flowing, possess good water quality, and
18 exhibit ORVs in the areas of cultural and historical resources, fisheries,
19 geology, and scenic resources. Part of the lowermost segment – Segment 4 –
20 would be periodically inundated if Shasta Lake is expanded. Segment 4 extends
21 from about 5,400 feet upstream from the McCloud River Bridge, beginning at
22 an elevation of 1,070 feet msl, to about Little Bollibokka Creek. The lower
23 extent of this segment corresponds with the current full-pool elevation of Shasta
24 Lake based on Reclamation geographic information system data. Figure 25-2
25 shows the downstream extent of Segment 4.

26 The Resources Agency’s report also identified 10 segments, but its evaluation
27 encompassed only 43 total river miles and the numbering of segments began at
28 the headwaters and counted downstream along the entire river. The segments
29 included six along the upper river (20 river miles above McCloud Reservoir)
30 and four along the lower river (23 river miles below McCloud Dam). Eight of
31 the 10 segments were determined eligible for State wild and scenic river status.
32 Segment 10 extends from the McCloud River Bridge to the northern border of
33 Section 9, Township 36 North, Range 3 West, which is just upstream from the
34 river’s confluence with Tuna Creek. Approximately 5,400 feet of the transition
35 reach is included in Segment 10; the portion of the transition reach downstream
36 from the bridge was determined ineligible. The downstream extent of Segment
37 10 is shown on Figure 25-2.



1
2

Figure 25-2. Differences in State and Federal Segments and Transition Reach

1 **25.2 Regulatory Framework**

2 **25.2.1 Federal**

3 ***Federal Wild and Scenic Rivers Act***

4 The Federal WSRA, enacted in 1968, established the National Wild and Scenic
5 Rivers System “to preserve rivers with outstanding natural, cultural, and
6 recreational values in a free-flowing condition for the enjoyment of present and
7 future generations.” To be eligible for inclusion in the system, a river must be
8 free-flowing and exhibit ORVs. Free-flowing means “existing or flowing in a
9 natural condition without impoundment, diversion, straightening, rip-rapping, or
10 other modification of the waterway” (16 United States Code (USC) Section
11 1286). ORVs are scenic, recreational, geologic, fish and wildlife, historic,
12 cultural, or other similar values (16 USC Section 1271). Depending on the
13 specific conditions of a river, it may be designated as “wild,” “scenic,” or
14 “recreation.” Different segments of a single river can receive different
15 designations; in other words, some segments can be designated wild, some
16 scenic, and some recreation or combinations of these designations.

17 Through the development and approval of the STNF LRMP, the USFS
18 determined that segments of the McCloud River are eligible for inclusion in the
19 national system; however, the river has not been formally designated and thus is
20 not afforded protections under the Federal WSRA. Instead, the McCloud River
21 CRMP was developed “to protect the [river’s] unique and outstandingly
22 remarkable features,” thereby maintaining its eligibility.

23 The USFS evaluation concluded that the lower McCloud River, from McCloud
24 Dam downstream about 22 miles to the river’s transition to Shasta Lake at about
25 1,070 feet msl, provides outstanding cultural, fisheries, and geologic values, and
26 its corridor has been classified as a highly sensitive visual area by the USFS
27 (USFS 1994 and 1995b). The entire river corridor contains prehistoric and
28 historic sites from past use by Indian tribes, late 1800 and early 1900 resorts,
29 and logging activities. The lower river provides habitat for trout species (bull
30 trout/Dolly Varden, which is believed to be extinct, and rainbow trout, which
31 has been transplanted all over the world) and is considered a “blue ribbon trout
32 fishery” (USFS 1994). Outstanding geologic values include rock outcrops,
33 cascades, and pools. Based on the ORVs, the STNF determined that the lower
34 McCloud River meets the eligibility requirements for designation under the
35 Federal WSRA.

36 ***Shasta-Trinity National Forest Land and Resources Management Plan***

37 The STNF LRMP is a forest-wide land use plan developed to guide resource
38 management within the forest (USFS 1995b). For planning purposes, the STNF
39 is divided into six land allocations for which specific management prescriptions
40 are identified. The land allocations include Congressionally Reserved Areas,
41 Late-Successional Reserves, Administratively Withdrawn Areas, Riparian
42 Reserves and Key Watersheds, Matrix Lands, and Adaptive Management Areas.

1 Management areas were identified within the STNF to establish management
2 direction in response to the issues and resources of each distinct area. The
3 Management Area defined for the McCloud River provides resource direction
4 for recreational use, specifically fishing and viewing waterfalls, and
5 management of old-growth habitat. Management of the wild and scenic river
6 ORVs of the McCloud River is deferred to the CRMP.

7 ***Coordinated Resource Management Plan***

8 In 1990, certain public agencies and private parties with interests in the
9 management of lands adjacent to the McCloud River executed a memorandum
10 of understanding to pursue preparation of a CRMP. The memorandum was
11 signed by representatives of the USFS, CDFW, The Nature Conservancy,
12 Pacific Gas and Electric Company (PG&E), the Bollibokka Land Company,
13 Crane Mills, McCloud River Co-Tenants, Sierra Pacific Industries, and the
14 Hearst Corporation. In 1991, the same signatories, along with California Trout
15 Inc., signed another memorandum of understanding to establish the framework
16 for and approve the CRMP. The CRMP was adopted in July 1991. In 2007, the
17 property owned by the Bollibokka Land Company was sold to Westlands Water
18 District, which is not a party to the CRMP.

19 The CRMP provides a framework for the coordination of management activities
20 among the participants to ensure that the characteristics of the river that make it
21 eligible for Federal wild and scenic river designation are protected. The CRMP
22 provides specific conditions for the USFS' management of the river and states
23 that the USFS "reserves the right to pursue [Federal wild and scenic river]
24 designation" if the CRMP is terminated or significantly impaired or if the
25 CRMP fails to protect the values that make the river suitable for such
26 designation.

27 **25.2.2 State**

28 ***California Public Resource Code, Sections 5093.50-5093.70***

29 Sections 5093.50–5093.70 were added to the State PRC in 1972, through
30 enactment of the California Wild and Scenic Rivers Act, to preserve certain
31 rivers that possess extraordinary scenic, recreational, fishery, or wildlife values
32 in their free-flowing state. The State PRC identifies, classifies, and provides
33 protection for specific rivers or river segments, as approved by the legislature.
34 Rivers or river segments that are specifically identified and classified in the
35 State PRC comprise the State Wild and Scenic Rivers System. As described in
36 Section 5093.50, rivers or river segments included in the State system must
37 possess "extraordinary scenic, recreational, fishery, or wildlife values"; the
38 State PRC does not define what constitutes "extraordinary."

39 Various amendments to the California Wild and Scenic Rivers Act have been
40 passed, adding related legislation to the State PRC. In 1986, Assembly Bill
41 (AB) 3101 (Statutes 1986, Chapter 894) established a study process to help
42 determine eligibility for potential additions to the State system (State PRC

1 Section 5093.547 and Section 5093.548). Additionally, protection for river
2 segments can be provided without formally identifying them as part of the State
3 system.

4 In 1989, an amendment to the California Wild and Scenic Rivers Act was
5 passed, adding Section 5093.542 to the State PRC to protect the McCloud River
6 fishery, which it describes as “one of the finest wild trout fisheries in the state.”
7 It further declares that “The continued management of river resources in their
8 existing natural condition represents the best way to protect the unique fishery
9 of the McCloud River” and that “maintaining the McCloud River in its free-
10 flowing condition to protect its fishery is the highest and most beneficial use of
11 the waters of the McCloud River.” The amendment provides protection to the
12 McCloud River fishery and its “natural” and “free-flowing” condition from
13 Algoma to the confluence with Huckleberry Creek (upper McCloud River), and
14 0.25 mile downstream from the McCloud Dam to the McCloud River Bridge
15 (lower McCloud River). Although the Legislature declared that the McCloud
16 River possessed “extraordinary resources” in the context of the State PRC, the
17 Legislature’s action stopped short of formally designating the river as wild and
18 scenic.

19 **25.3 Affected Environment**

20 This section defines “affected environment” as the wild and scenic
21 characteristics of the lower McCloud River that could be affected by the
22 proposed modifications to Shasta Dam and Shasta Lake. It briefly describes the
23 McCloud River from its headwaters to the McCloud Arm of Shasta Lake. It
24 then describes the wild and scenic values of Segment 4 identified in the USFS
25 evaluation and the values provided protection in the State PRC.

26 Descriptions of the river and its characteristics were derived primarily from the
27 following sources:

- 28 • Wild and Scenic Rivers Evaluation, Appendix E to the EIS for the
29 Shasta-Trinity National Forest Land and Resources Management Plan
30 (USFS 1994)
- 31 • Lower McCloud River and McCloud Arm Watershed Analyses (USFS
32 1998a and 1998b)
- 33 • McCloud River Wild and Scenic River Report (Jones & Stokes
34 Associates 1988)
- 35 • Lower McCloud River Wild Trout Area Fishery Management Plan,
36 2004 through 2009 (Rode and Dean 2004)
- 37 • Lower McCloud River Habitat Typing Report (USFS 2001)

1 **25.3.1 The McCloud River**

2 ***McCloud River Basin***

3 The McCloud River basin drains an area of approximately 800 square miles
4 (USFS 1998a) in northern Shasta County and southern Siskiyou County,
5 southeast of Mount Shasta. The river originates in an area of the STNF near
6 Colby Meadows at approximately 4,250 feet above msl (Rode and Dean 2004).
7 From its headwaters to Shasta Lake, the river is approximately 59 miles long.
8 McCloud Reservoir, part of PG&E's McCloud-Pit Hydroelectric Project,
9 separates the upper river from the lower river. The lower McCloud River
10 transitions into the McCloud Arm of Shasta Lake upstream from the McCloud
11 River Bridge (Figure 25-3).

12 ***Upper McCloud River***

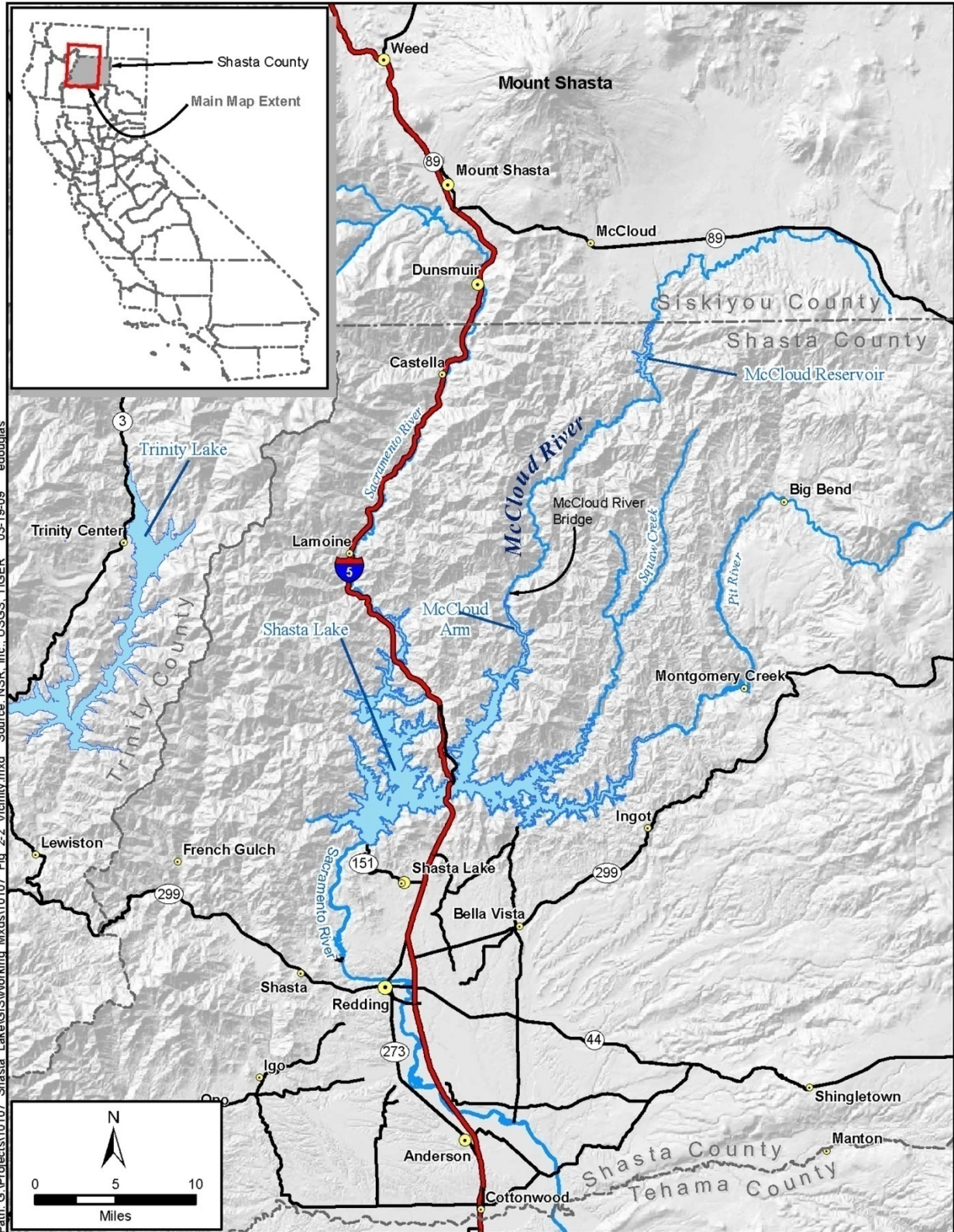
13 The upper McCloud River is an approximately 36-mile reach from the river's
14 origins at Colby Meadows downstream to the transition with McCloud
15 Reservoir. The river basin above the reservoir drains an area of approximately
16 403 square miles. Mean monthly flows in the upper McCloud River range from
17 766 cubic feet per second (cfs) in October to over 1,000 cfs in March, April, and
18 May (PG&E 2006).

19 ***McCloud Reservoir***

20 The McCloud Reservoir is a major component of PG&E's McCloud-Pit
21 Hydroelectric Project, which was constructed in 1965 and operates under
22 license from the Federal Energy Regulatory Commission (FERC). The
23 McCloud Reservoir is approximately 5 miles long and has a storage capacity of
24 approximately 35,200 acre-feet of water. The McCloud-Pit Hydroelectric
25 Project diverts approximately 75 percent of the upper McCloud River's flow
26 through a pipeline to Iron Canyon Reservoir, then conveys it downslope and
27 discharges it into the Pit River at the Pit 6 powerhouse, upstream from the Pit
28 River Arm of Shasta Lake (PG&E 2006). The remaining 25 percent of flows
29 provide base flow for the lower McCloud River, a considerable reduction from
30 historic flow volumes (Jones & Stokes Associates 1988).

31 ***Lower McCloud River***

32 The lower McCloud River flows southwesterly through a deep canyon with
33 steep slopes approximately 22 miles from McCloud Dam downstream to the
34 transition with Shasta Lake. Vegetation along the lower river is predominately
35 mixed-conifer and Douglas-fir forest. This stretch of river receives runoff from
36 a 404-square-mile area of the lower McCloud River basin and the 95-square-
37 mile Squaw Valley Creek basin. It provides exceptional fishing opportunities
38 and includes two long-established fishing clubs, the Bollibokka Club and the
39 McCloud River Club. The Nature Conservancy's McCloud River Preserve also
40 encompasses a portion of the lower McCloud River.



1
 2 **Figure 25-3. Regional Location**

1 Flows in the lower McCloud River have been controlled by releases from
2 McCloud Dam since 1965 (PG&E 2006). Under its current FERC license,
3 PG&E’s McCloud-Pit Hydroelectric Project maintains a minimum instream
4 flow of 50 cfs from May through November and 40 cfs from December through
5 April through controlled releases. Accordingly, flows in the lower McCloud
6 River are highly regulated, and annual flows in the river below McCloud Dam
7 do not follow a pattern typical of an unimpaired mountain river in northern
8 California. Prior to dam construction, flows in the lower river were considerably
9 higher, estimated to be in the range of 924 to 1,245 cfs (mean monthly flows)
10 from June to October (Jones & Stokes Associates 1988, citing U.S. Geological
11 Survey (USGS) for the period of 1967 to 1985).

12 ***McCloud Arm of Shasta Lake***

13 The construction of Shasta Dam between 1938 and 1945 converted part of the
14 lower McCloud River into the McCloud Arm of Shasta Lake. The McCloud
15 Arm is more than 16 miles long, with approximately 70 miles of shoreline. It
16 drains an area of approximately 41,000 acres (USFS 1998b). Water levels in the
17 arm fluctuate with the lake’s water levels, and during periods of lower water
18 levels, a water line, known as the “bathtub ring,” is evident along the banks.
19 During extended periods of lower water levels, vegetation may become
20 established on the exposed banks.

21 The upper extent of the lake encompasses the transition reach, which varies
22 between about 920 and 1,070 feet msl. Because of the effects of Shasta Lake on
23 the McCloud Arm, the STNF determined that the transition reach did not meet
24 the eligibility requirements of a wild and scenic river (USFS 1994). The USFS
25 defined the upper limit of the McCloud Arm as an elevation of 1,070 feet, or
26 approximately 5,400 feet above the McCloud River Bridge. This elevation
27 corresponds to the lower limit of Segment 4. A portion of the transition reach –
28 from the McCloud River Bridge to the 1,070-foot elevation – is included in the
29 segments of the river provided protection under the State PRC.

30 The transition reach provides a corridor for fish migrating between Shasta Lake
31 and the lower McCloud River and contributes to the unique fishery of the river.
32 Common fish in the McCloud Arm include rainbow trout, spotted bass, riffle
33 sculpin, and speckled dace (North State Resources, Inc. 2008).

34 Water temperatures in the McCloud Arm become warmer as the river
35 transitions to Shasta Lake. The warmer temperatures associated with Shasta
36 Lake support warmwater fish, but the cooler temperatures of the transition reach
37 may prevent some fish from migrating upstream into the lower river. Water
38 temperatures in the transition reach may be suitable for warmwater species.

25.3.2 The McCloud River's Wild and Scenic Values

This section focuses on the wild and scenic river characteristics and ORVs of the lower McCloud River identified by the USFS in the wild and scenic river evaluation performed for the STNF LRMP (USFS 1994) and the wild and scenic river characteristics and extraordinary value protected under the State PRC.

The McCloud River's fishery and its free-flowing condition are identified in both the USFS evaluation and the State PRC. These characteristics are discussed first, followed by a discussion of the wild and scenic characteristics and values – water quality, geology, cultural/historical resources, and visual quality/scenery – that are identified only in the USFS evaluation.

Specific information is lacking concerning the river reach that could periodically be inundated if Shasta Dam and Shasta Lake were enlarged because the lands along this part of the river are privately owned and access for biological and other surveys has been limited; therefore, general information concerning the lower McCloud River as a whole is provided for some resource areas. This section also includes a brief description of the current transition reach (see Figure 25-1) because the reach of the river that would be newly inundated would likely take on the characteristics of the existing transition reach.

Fishery

The fishery of the lower McCloud River is unique; the river is considered a premier trout fishery, despite the ongoing effects of McCloud Dam and Shasta Lake on the river's flows and water quality. To characterize the fishery, this section includes descriptions of the aquatic habitat in USFS Segment 4, the Resources Agency's Segment 10, and the transition reach as well as the fish species that inhabit the study area.

Aquatic Habitat The lower McCloud River is characterized as a series of alternating riffles, pools, and cascading pocket water occurring along a broad, boulder-studded river channel within a confined, heavily timbered valley. A narrow band of montane riparian vegetation (typically less than 25 feet wide) dominated by willows, white alders, and Oregon ash occurs along the river banks adjacent to steep hill slopes with mixed conifer-Douglas-fir forest (USFS 2001).

In 2001, the USFS prepared a Habitat Typing Report to characterize aquatic habitats in the lower McCloud River from the McCloud River Bridge to McCloud Dam. The report divided the lower river into four reaches: McCloud Dam to Ladybug Creek, Ladybug Creek to Clairborne Creek, Clairborne Creek to Tuna Creek, and Tuna Creek to McCloud River Bridge. The reach from Tuna Creek to McCloud River Bridge includes all of Segment 4 and nearly all of Segment 10, including the portion of the transition reach that is part of Segment

1 10. Data are not available for the transition reach below the McCloud River
2 Bridge downstream to Shasta Lake.

3 The dominant aquatic habitat in the reach of the lower river from Tuna Creek to
4 McCloud River Bridge includes runs (20 percent), mid-channel pools (18
5 percent), low-gradient riffles (18 percent), lateral scour pools from bedrock (11
6 percent), and pocket water (10 percent) (USFS 2001). This reach provides most
7 of the corner pool (100 percent), glide (89 percent), and cascade (50 percent)
8 habitats in the lower river.

9 The portion of the transition reach upstream from McCloud River Bridge is
10 dominated by low-gradient riffles and mid-channel pools, with some pocket
11 water, glides, runs, and lateral scour pools. Glide habitat is the dominant aquatic
12 habitat between the 1,070-foot and 1,080-foot elevations, and pocket water is
13 the dominant aquatic habitat between the 1,080-foot and 1,090-foot elevations.
14 The habitat within the current transition reach represents a fraction of the total
15 available aquatic habitat within the lower McCloud River and provides a small
16 portion of the habitats within the reach from the McCloud River Bridge to Tuna
17 Creek.

18 The diversity of riffles, flatwater habitat, and pools is influenced by the
19 presence of boulders and cobble substrate and variations in flow conditions. The
20 lower river is dominated by boulders with pockets of gravel present at pool
21 tailouts and in velocity breaks behind large boulders. The riffles are generally
22 higher gradient channel sections with turbulent surface flow and uniform cobble
23 and boulder substrates. While swift pocket water in the lower McCloud River
24 often appears more like a riffle than a run, the habitable eddies, or pockets,
25 created behind the boulders that characterize this habitat type make it
26 functionally more similar to the other flatwater habitats (USFS 2001).
27 Typically, flatwater and pools are the principal habitats used by the trout in the
28 McCloud River for rearing and feeding (Wales 1939, Rode and Dean 2004,
29 USFS 2001).

30 The USFS (2001) reported that the aquatic habitat within the transition reach
31 has undergone type conversions caused by aggradation and scour of sediments
32 for about 3,700 feet upstream from the McCloud River Bridge. When Shasta
33 Lake is drawn down, large, wide, low-gradient riffles with channel braiding
34 dominate in this reach. When the lake is at full pool and at intermediate levels
35 of drawdown, the transition reach becomes inundated, but a unidirectional
36 current created by the lower McCloud River's inflow is detectable throughout
37 the inundation zone, slowing as it approaches the flat water of Shasta Lake. To
38 varying degrees, this fluctuating backwater effect converts this reach to a deep,
39 wide, slow-moving riverine habitat transitioning to lacustrine habitat near the
40 bottom of the transition reach.

1 **Fish Species** The current composition and distribution of fish species
2 inhabiting the lower McCloud River and Shasta Lake reflect the historic fishery,
3 the operational effects of Shasta Dam and McCloud Dam, and the introduction
4 of nonnative fish species into the river and Shasta Lake. The completion of
5 Shasta Dam in 1945 eliminated all runs of anadromous fish in the river (Rode
6 and Dean 2004). The historic fishery included Chinook salmon (*Oncorhynchus*
7 *tshawytscha*), steelhead (*O. mykiss irideus*), rainbow trout (*O. mykiss*), and the
8 only known California occurrence of the bull trout (*Salvelinus confluentus*). The
9 bull trout is believed to have been extirpated from the lower McCloud River and
10 is possibly extinct in California. Today, the fishery is dominated by rainbow
11 trout and brown trout (*Salmo trutta*), an introduced species that migrates
12 between Shasta Lake and the lower McCloud River. Other nonnative species
13 also migrate up the lower McCloud River, including spotted bass (*Micropterus*
14 *punctulatus*), but bass have not been confirmed upstream from Tuna Falls, a
15 high-gradient rapid at the confluence with Tuna Creek. Despite the change in
16 fish species in this 22-mile reach, the lower McCloud River is still considered
17 one of California's premier trout streams.

18 Fish observed in the river downstream from the Tuna Creek confluence during a
19 survey conducted in summer 2007 included rainbow trout, spotted bass,
20 speckled dace (*Rhinichthys osculus*), sculpin spp. (*Cottus* spp.), Sacramento
21 sucker (*Catostomus occidentalis*), and Sacramento pikeminnow (*Ptychocheilus*
22 *grandis*) (North State Resources, Inc. 2008). Other fish that occur in this reach
23 include brown trout, brook trout (*Salvelinus fontinalis*), hardhead
24 (*Mylopharodon conocephalus*), and smallmouth bass (*Micropterus dolomieu*).
25 The status of the riverine fish species of the lower McCloud River is identified
26 in Table 25-1.

27 *Rainbow Trout* Fluvial and adfluvial populations of rainbow trout use the
28 habitat available throughout the lower McCloud River. The McCloud River
29 rainbow trout became known as "the rainbow of the fish culturist" because eggs
30 from that population accounted for transplants of rainbow trout in the 1880s to
31 the eastern states and several other countries.

32 The rainbow trout that inhabit the McCloud River are a vigorous, active fish
33 that primarily inhabit swifter portions of pool and pocket water habitats. Adults
34 migrate into the lower McCloud River from Shasta Lake in the spring and fall
35 months, presumably to spawn. Suitable spawning habitat in the study area is
36 limited, and the trout likely migrate further upstream to spawn (North State
37 Resources, Inc. 2008).

38 Although the genetic origin of these fish has not been evaluated, the numerous
39 strains of rainbow trout planted in Shasta Lake over the years have likely
40 resulted in some introgression among migratory rainbow trout in the lower
41 McCloud River. The degree to which this migratory population of rainbow trout
42 contributes to the native trout fishery of the river is not specifically known;
43 however, available data do not indicate that it is substantial.

1 **Table 25-1. Riverine Fish Species of the Lower McCloud River**

Species	Current Status	Comments
Sacramento sucker (<i>Catostomus occidentalis</i>)	Common	Native, non-game species, observed during 2007 surveys
Riffle sculpin (<i>Cottus gulosus</i>)	Common	Native, non-game species, observed during 2007 surveys
Smallmouth bass (<i>Micropterus dolomieu</i>)	Uncommon	Introduced sport species in Shasta Lake, moves into lower river from lake, warmwater species
Spotted bass (<i>Micropterus punctulatus</i>)	Uncommon	Introduced sport species in Shasta Lake, moves into lower river from lake, observed during 2007 surveys, warmwater species
Hardhead (<i>Mylopharodon conocephalus</i>)	Uncommon	Native, non-game species
Rainbow trout (<i>Oncorhynchus mykiss</i>)	Abundant	Native trout species, subject to special angling regulations, coldwater species, observed during 2007 surveys
Sacramento squawfish (=pikeminnow) (<i>Ptychocheilus grandis</i>)	Common	Native, non-game species, observed during 2007 surveys
Speckled dace (<i>Rhinichthys osculus</i>)	Common	Observed during 2007 surveys
Brown trout (<i>Salmo trutta</i>)	Common	Introduced sport species found throughout the river, migrates from Shasta Lake to spawn in lower river, subject to special angling regulations, coldwater species
Bull trout (<i>Salvelinus confluentus</i>)	CE; Extinct	Native, believed extirpated from entire river by mid-1970s, a few restoration experiments performed in upper river tributaries, coldwater species
Brook trout (<i>Salvelinus fontinalis</i>)	Rare	Introduced sport species, stocking in upper river and tributaries discontinued, very rarely observed in lower river, coldwater species

Sources: Wales 1939, Tippets and Moyle 1978, Rode and Dean 2004, Moyle 2002, CDFW, unpublished data, North State Resources, Inc. 2008

Key:

CE = California Endangered

CDFW = California Department of Fish and Wildlife

2 Rainbow trout typically mature in their second to third year and move upstream
 3 to spawn in the lower McCloud River and its tributaries from February to June.
 4 The eggs typically hatch in 3 to 4 weeks, depending on water temperature, and
 5 fry emerge 2 to 3 weeks later. The fry remain in quiet waters close to shore,
 6 among cobbles, or under overhanging vegetation for several weeks. As the fish
 7 grow, they move into swifter water habitats.

8 In the river, this species forms feeding station hierarchies, which they
 9 aggressively defend, and prey on aquatic and terrestrial insects drifting in the
 10 current. They also eat active bottom invertebrates. It has been reported that
 11 McCloud River rainbow trout tend to be more bottom-oriented when feeding
 12 than rainbow trout elsewhere.

1 In reservoirs, rainbow trout form loose schools and feed on both invertebrates
2 and other fish, although fish dominate their diet as they grow larger. Preferred
3 prey in Shasta Lake is the threadfin shad. Trout growth in Shasta Lake is more
4 rapid than for fluvial trout. The optimum temperature range for growth and for
5 completion of most life stages of rainbow trout is between 50 and 70 degree
6 Fahrenheit (°F), though they seem to prefer and thrive at temperatures in the
7 lower two-thirds of this range. Rainbow trout in lakes and streams seldom live
8 for more than 6 years.

9 *Brown Trout* Like the rainbow trout, fluvial and adfluvial populations of
10 brown trout use habitat throughout the lower McCloud River, but this species
11 migrates more between the lake and river. It is not as abundant as the rainbow
12 trout. CDFW biologists suggest that this species occupies an ecological niche
13 previously occupied by bull trout in the lower McCloud River (Rode and Dean
14 2004).

15 Only some of the brown trout migrating from Shasta Lake that passed a lower
16 river counting weir were observed upstream in the Wild Trout Management
17 Area (segments 7, 8, 9, and 10), so the actual extent of the spawning grounds of
18 migratory brown trout is not fully known.

19 Brown trout mature in their second or third year. Some fish may mature in the
20 river while others may migrate to Shasta Lake to feed, returning to spawn on a
21 recurring basis. The stimulus for upstream migration is often a rise in stream
22 flow or changing lake temperatures. Spawning takes place from November
23 through December when water temperatures fall below 50°F. Eggs typically
24 hatch within 7 to 8 weeks, depending on water temperature. Fry emerge from
25 the gravel 3 to 6 weeks later. The habitats used by juvenile brown trout are
26 similar to those used by rainbow trout; however, as brown trout grow, they tend
27 to select habitats with slower water and more cover. In the riverine
28 environment, brown trout prefer slow, deep pools with abundant boulder and
29 bedrock ledge cover. The timing of emigration of juvenile brown trout to Shasta
30 Lake is not known.

31 Fluvial brown trout have diets similar to those of rainbow trout, but appear to
32 feed more on the stream bottom for benthic prey than rainbows. As brown trout
33 grow, their diet expands to include larger invertebrate prey and fish. Larger
34 brown trout are voracious predators, especially on fish, including young
35 salmonids. In Shasta Lake, adult brown trout prefer threadfin shad as a staple
36 prey.

37 Brown trout growth in the lower McCloud River appears to increase after age 3,
38 which has been attributed to their migration to Shasta Lake to exploit the forage
39 fish populations. Brown trout growth is best at temperatures ranging from 45 to
40 69°F, though they seem to prefer and dominate other trout species near the
41 upper half of this range.

1 *Spotted Bass and Smallmouth Bass* Black basses and other sunfishes dominate
2 in the littoral zones of Shasta Lake. Spotted bass and smallmouth bass are now
3 the most common black basses in Shasta Lake, with spotted bass having
4 become most frequent over the past 20 years. Both spotted and smallmouth bass
5 occupy shallow, low-gradient habitat offered by Shasta Lake and its tributaries.
6 They can be found throughout Shasta Lake and in the lower ends of the main
7 tributary streams, including the lower McCloud River. However, the extent to
8 which black bass have colonized the lower McCloud River is not currently
9 known.

10 Smallmouth bass and spotted bass share similar life histories, and these
11 similarities may account for their persistence in Shasta Lake compared to that of
12 largemouth bass, which have declined in numbers. Both smallmouth and spotted
13 bass mature in their second or third year and spawn in the late spring.
14 Smallmouth will spawn at cooler temperatures (55 to 61°F) than spotted bass
15 (greater than or equal to 65°F). Both species seek quiet shallow areas over mud,
16 sand, gravel, and rocky, debris-littered bottoms to spawn in both lakes and
17 streams. This type of spawning habitat is available in the transition reach of the
18 lower McCloud River, especially when lake levels are high.

19 Juvenile bass feed on small invertebrates until they are large enough to prey on
20 small fish and large invertebrates. Temperature preferences and optimal growth
21 for both species of black basses is attained in the range from 68 to 81°F.
22 Because of the year-round cool temperatures (less than or equal to 68°F) of the
23 lower McCloud River, temperatures preferred by bass only occur during the late
24 summer and early fall months upstream from the transition reach. Therefore, the
25 temperature regime of the lower McCloud River may limit intrusions of bass
26 from the lake. However, spotted bass were observed in the lower river below
27 the confluence of Tuna Creek during summer fish surveys (North State
28 Resources, Inc. 2008).

29 ***Free-Flowing Condition***

30 The Federal WSRA defines *free flowing* as “existing or flowing in natural
31 condition without impoundment, diversion, straightening, rip-rapping, or other
32 modification of the waterway” (16 USC Section 1286). The State PRC defines
33 free-flowing as “existing or flowing without artificial impoundment, diversion,
34 or other modification of the river.” It states, however, that the “presence of low
35 dams, diversion works, and other minor structures does not automatically bar a
36 river’s inclusion in the system.”

37 Base flows in the lower McCloud River are partially controlled by releases from
38 McCloud Reservoir in accordance with PG&E’s FERC license and include
39 precipitation and inflow from tributaries. The lower McCloud River experiences
40 seasonal fluctuations and large variations in base flows (USFS 1998a). Releases
41 from McCloud Reservoir into the lower river are heavily regulated, with a
42 minimum release requirement of 50 cfs from May through November and 40 cfs
43 from December through April; the releases are typically well above these

1 minimum requirements and tend to stay above 100 cfs (USFS 1998a). Tributary
2 contributions are the most noticeable flows during storm events, but are
3 substantially reduced during low-flow conditions. Because of the minimum
4 release requirements from McCloud Reservoir, spring and summer flows are
5 considerably more stable than they would be under unregulated conditions.

6 PG&E monitors lower McCloud River flows in accordance with its FERC
7 license at a gaging station in Segment 4 upstream from Shasta Lake (0.2 mile
8 downstream from Big Bollibokka Creek); the most recent available water data
9 record covers the water year October 2006–September 2007 (USGS 2007). For
10 this period, measured mean monthly flows ranged from 235 cfs in August to a
11 high of 1,185 cfs in February, with maximum flows as high as 5,010 cfs.

12 Over the course of the year, the transition from lake to river expands and
13 contracts over a distance of about 1.7 miles due to changing water levels in
14 Shasta Lake (Figure 25-2). During April and May of wet years, the transition
15 reach extends about 1 mile (5,400 feet) upstream from the McCloud River
16 Bridge to the full pool elevation of 1,070 feet msl, the downstream boundary of
17 Segment 4. As described in Chapter 6, “Hydrology, Hydraulics, and Water
18 Management” Shasta Lake reaches full-pool elevation about one year in three.

19 Despite upstream and downstream dams and diversions, the lower McCloud
20 River meets the definition of a free-flowing river under both the Federal WSRA
21 and State PRC.

22 **Water Quality**

23 The water quality of the lower McCloud River is influenced by natural
24 processes and land use activities, including PG&E’s McCloud-Pit Hydroelectric
25 Project, timber management activities, and roads. Overall, the water quality of
26 the river is rated as good (USFS 1998). Glacial silt gives the river “a beautiful
27 turquoise color typical of rivers draining glacial valleys in British Columbia and
28 Alaska” (Jones & Stokes Associates 1998).

29 Turbidity and water temperature are two important factors that influence the
30 water quality of the river and affect aquatic habitat. Turbidity is caused by
31 suspended sediment transported from upstream waters and in surface runoff,
32 particularly from disturbed landscapes, such as timber harvest areas or roads.
33 Water temperature is affected by a variety of conditions, such as river flows,
34 solar radiation, and density of vegetation along the river, but is closely tied to
35 the temperature of the flows released from the McCloud Reservoir.

36 The turbidity of the lower McCloud River is influenced by the water quality and
37 water levels of the McCloud Reservoir and runoff from upland areas throughout
38 the basin. Turbidity levels are generally low during most of the year, ranging
39 from 5–10 nephelometric turbidity units, but can spike to more than 900 units
40 during periods of intense rainfall and flood flows (PG&E 2006).

1 Sediment becomes trapped at McCloud Dam and is released into the lower river
2 during large storm events, temporarily increasing turbidity levels, especially in
3 the upper segments of the lower river. Testing of the McCloud Dam bypass
4 valve can cause high turbidity for a short period when sediment is discharged
5 from the reservoir into the lower McCloud River. Surface runoff, especially
6 after the first storms of the wet season, can contribute large amounts of turbid
7 runoff from upland areas.

8 The length of the transition reach depends on the water year type. As the
9 transition reach moves upstream, sediment within the reach is remobilized and
10 turbidity levels respond accordingly. Periodic fluctuations in water levels can
11 result in erosion along the banks and localized increases in turbidity levels in
12 the transition reach and the McCloud Arm.

13 The year-round cool water temperature regime of the lower McCloud River
14 inhibits the productivity of its fishery, but provides high-quality holding habitat
15 for salmonids, contributing to the river's unique value as a tributary to Shasta
16 Lake. The controlled releases from McCloud Dam appear to have a direct
17 bearing on the water temperatures downstream. Water temperatures tend to be
18 higher in Segment 4 than immediately below McCloud Dam. Data recorded at
19 PG&E's monitoring station on the river just upstream from Shasta Lake (0.2
20 mile downstream from Big Bollibokka Creek) indicate that water temperature
21 ranges from the high 30s to the upper 60s (°F), with lower temperatures in the
22 winter and higher temperatures in the summer (PG&E 2006).

23 The infusion of cooler water from the lower McCloud River influences water
24 temperatures in the transition reach throughout the year. The degree of influence
25 depends on the amount of discharge from the river and Shasta Lake levels. The
26 temperatures throughout the lower McCloud River also control to some degree
27 the distribution of the warmwater fishery known to occupy the river below Tuna
28 Falls.

29 ***Outstandingly Remarkable Values Identified in USFS Evaluation***

30 **Cultural/Historical Resources** Cultural resources include archaeological
31 sites, historical structures and sites, and areas of religious or cultural
32 significance to Native Americans. Significant resources that provide important
33 information on the prehistory and history of an area or that are considered
34 sacred to Native Americans can contribute to wild and scenic river values.

35 The McCloud River basin was part of a major center of occupation by the
36 Wintu people, who occupied the McCloud River area at the time of Euro-
37 American contact in the 1800s. Although much of the Wintu territory was
38 overrun with miners and other opportunistic Euro-Americans, the lower
39 McCloud River was left largely untouched due in part to a lack of easily mined
40 materials and the ruggedness of the terrain (Yoshiyama and Fisher 2001), but
41 also because of the resistance of the Wintu to incursions into their territory.
42 Because of its generally undisturbed nature, the significance of the lower

1 McCloud River to prehistoric and ethnographic records of this area of
2 California's history is considered to be great (Jones & Stokes Associates 1988).

3 Within the 0.25-mile corridor deemed eligible by the USFS, three formally
4 recorded sites and other known sites contribute to the lower river's ORVs
5 because they provide important information on the use of the area from before
6 the Late Archaic Period (1300 to 150 before present, calibrated using
7 radiocarbon dating) to the Historic Era (1840 to present). Three Wintu villages,
8 called Tsekerenwaitsoigi, Klolwakut, and Boloibaki, are thought to have been
9 located in the general area of the present-day Bollibokka Club headquarters
10 (Guilford-Kardell 1980), which is part of the former Wintu territory. These
11 villages likely represent the typical lifestyle of the Wintu at the time of Euro-
12 American contact, when they lived in permanent villages near rivers and
13 streams and were semi-sedentary, foraging people (DuBois 1935). As part of
14 the Wintu occupation of this area, prehistoric, historic, and modern Traditional
15 Cultural Properties, sacred locations, and important use areas are located
16 throughout the lower McCloud River basin (outside of the 0.25 mile corridor),
17 including features such as mountains, unique landforms, caves, distinctive rock
18 outcrops, waterfalls, pools, springs, and resource gathering areas.

19 Point McCloud Bridge (known as McCloud River Bridge in this chapter) is a
20 historical resource that was constructed in 1940 and altered in 1986; the bridge
21 would be subject to relocation in conjunction with SLWRI activities. The
22 Bollibokka Club is a historical resource located on the north bank of the river
23 between the confluence of Big Bollibokka Creek on the east and Wittawaket
24 Creek on the west. Buildings associated with the club were built between the
25 1860s and 1920s by Austin and Rueben Hills, the founders of Hill's Brothers
26 Coffee, and previous owners (Lucas and Stienstra 2007). A log cabin dates from
27 the 1860s, and other structures date from the ownership of the Hills Family,
28 including the clubhouse built in 1924 and a structure built of river cobble in
29 1915 (Whitney 2004). Although these resources could be eligible for listing on
30 the National Register of Historic Places, they have not been formally evaluated.

31 The fishery of the lower McCloud River was also very important to prehistoric
32 and historic uses of the area. The Native Americans in the lower McCloud River
33 basin conducted communal fish drives of salmon or steelhead at night, which
34 brought together many communities and provided opportunities for trade and
35 social networking, including the parsing out of the catch among the people and
36 villages involved (DuBois 1935). Fish, including salmon, steelhead, Sacramento
37 sucker, freshwater shellfish, and lamprey, were an important part of the Native
38 American diet in this area. When the northern mines opened in the 1800s,
39 settlers moved into the area, and the McCloud River and other rivers' fisheries
40 provided important sources of food. In the early years of settlement, fish and
41 game in the area were used for subsistence; however, this changed with the
42 formation of the State of California and increased fishery management and
43 recreational fishing.

1 **Geology** The lower McCloud River flows through a number of geologic
2 formations, including the McCloud Limestone formation. This formation
3 contains fossilized remains of invertebrate and vertebrate fauna that provide
4 important scientific information on the history of California, and it has a high
5 potential for research. According to the USFS (1998b), the limestone features
6 exposed at a number of locations around Shasta Lake are unique and contribute
7 to worldwide paleontological knowledge. The McCloud Limestone contains 36
8 species of corals, some of which may form the basis of a new taxonomic group.

9 Because of its very diverse fossil faunas, the mountainous terrain between the
10 McCloud and Pit arms of Shasta Lake is perhaps California’s single most
11 important area for paleontological research (Munthe and Hirschfield 1978, cited
12 in USFS 1998b). The limestone outcrops on the ridge immediately northwest of
13 McCloud River Bridge (several hundred vertical feet above Shasta Lake) have
14 produced several large Mississippian and Pennsylvanian invertebrate faunas.
15 Because this period is poorly represented on the West Coast, this fossiliferous
16 limestone is important to understanding the late Paleozoic evolution in this part
17 of the country (USFS 1998b). Limestone outcrops adjacent to the McCloud
18 Arm also provide habitat for several special-status species, such as Shasta
19 salamander, Shasta eupatorium, Howell’s cliff-maids, and Shasta snow-wreath
20 (Reclamation 2003).

21 Exposed outcrops of the limestone formation are visible from the lower
22 McCloud River in and upslope of the transition reach and contribute to its
23 scenic values.

24 **Visual Quality/Scenery** The visual setting of the lower McCloud River
25 upstream from Shasta Lake includes views of the river, limestone rock outcrops,
26 adjacent coniferous and oak forests, and infrastructure associated with the
27 Bollibokka and McCloud River clubs. A USGS stream gage has also been in
28 place for a number of years. The pristine nature of the lower river provides for
29 high-quality scenic views. However, the scenic views of the lower McCloud
30 River are enjoyed by only a limited number of viewers, consisting primarily of
31 private landowners, club members, and their guests.

32 Views of the river include “picturesque cascading whitewater, and deep, long,
33 green- or turquoise-colored pools,” with Douglas-fir and black and canyon oaks
34 dominating the steep slopes and hillsides along the river (Jones & Stokes
35 Associates 1988). Several buildings are present at the Bollibokka Club
36 headquarters, but these structures blend in with the visual setting. The transition
37 reach exhibits some evidence of fluctuating surface water elevations associated
38 with changes in water levels of Shasta Lake. Areas that are noticeably affected
39 by the reservoir levels exhibit “a bathtub ring of steep, treeless slopes with
40 occasional deposits of alluvium.”

1 The scenic views make most of the lower McCloud River, including Segment 4,
2 eligible as a scenic river under the Federal WSRA (USFS 1994). To be
3 classified as a scenic river, the river must be free of impoundments, be
4 accessible in places by roads, and have a river basin/shoreline that is largely
5 undeveloped. Segment 4 does not contain any human-made or other
6 impoundments that affect its free-flowing conditions. Roads to the Bollibokka
7 Club provide access to portions of Segment 4 for members of the club and their
8 guests. Currently, public access is limited to pedestrians on USFS lands along
9 the shoreline of Shasta Lake. For these reasons, the USFS has determined that
10 this segment meets the eligibility requirements of a scenic river under the
11 Federal WSRA.

12 **25.4 Environmental Consequences and Mitigation Measures**

13 This section identifies how the characteristics of the lower McCloud River that
14 make it eligible for listing under the State PRC and Federal WSRA could be
15 affected by each alternative and whether the alternatives would conflict with the
16 provisions of the STNF LRMP and the CRMP.

17 **25.4.1 Methods and Assumptions**

18 This analysis of environmental consequences focuses on the effects of proposed
19 modifications to Shasta Dam and Shasta Lake on the McCloud River's free-
20 flowing conditions, its water quality, and the ORVs (cultural resources,
21 fisheries, geology, and scenery) that make it eligible for listing as a wild and
22 scenic river under the Federal WSRA. In large part, the environmental effects
23 are based on computer modeling of water levels and the anticipated changes in
24 the environment due to fluctuations in water levels and expansion of the
25 transition reach. Physical effects to the free-flowing conditions, water quality,
26 and ORVs are analyzed in terms of their effects on the eligibility of the river for
27 wild and scenic river designation. While aquatic habitat data are used to
28 quantify the relative impact to fishery values, a qualitative analysis is provided
29 for most resources because of a lack of quantitative data and the subjective
30 nature of the values. Information to support the analysis was generated from
31 available literature and planning documents and technical studies prepared as
32 part of the SLWRI as well as other chapters in this DEIS.

33 ***CalSim Modeling***

34 The CalSim-II computer model was used to assist in the evaluation of the
35 potential impacts of the project alternatives on water-related resources. The
36 model used historical data on California hydrology to represent the variety of
37 weather and hydrologic patterns, including wet periods and droughts, under
38 which water storage and conveyance facilities would be operated. Two
39 scenarios (base cases) of demands for, and storage and conveyance of, water
40 were used in model runs: 2005 facilities and demands ("existing conditions")
41 and forecasted 2030 demands and reasonably foreseeable projects and facilities
42 ("future conditions"). A model run was conducted for each of these base cases

1 combined with each alternative so that the effects of the No-Action Alternative
2 and the action alternatives could be evaluated for both existing and future
3 conditions.

4 The analysis focuses on the environmental effects in the portion of segment 4
5 that would periodically be inundated. These effects are discussed in the
6 following section.

7 ***Gage Data***

8 PG&E, in coordination with USGS, monitors McCloud River flows in
9 accordance with its FERC license for the McCloud-Pit Hydroelectric Project at
10 a gaging station just upstream from the McCloud River Bridge, approximately
11 0.2 mile downstream from Big Bollibokka Creek (USGS 11368000 McCloud
12 River above Shasta Lake, California). The station measures mean, minimum,
13 and maximum monthly flows in the lower McCloud River. The most recent
14 available water data record covers the water year of October 2011 to September
15 2012 (USGS 2012). This data was used to describe flow conditions in the lower
16 McCloud River.

17 ***Water Quality Monitoring***

18 Current and historical water quality monitoring data for the McCloud River
19 have been collected by federal and state agencies as well as PG&E and The
20 Nature Conservancy. The California Department of Water Resources maintains
21 water quality information on the McCloud River in the California Data
22 Exchange Center database. The Nature Conservancy monitors water quality at
23 the McCloud River Preserve. Water quality monitoring of the lower McCloud
24 River includes measures of water temperature, dissolved oxygen, pH, specific
25 conductance, and turbidity, as well as correlated data on weather, air
26 temperature, and debris movement. PG&E monitors water quality in
27 compliance with its FERC license. Available information on water quality was
28 used to describe the setting of the lower river and assess changes in water
29 quality that would occur as a result of the Shasta Dam modification alternatives.

30 ***Habitat Typing***

31 The USFS stream habitat typing performed in 1999 and 2000 (STNF, December
32 2001 unpublished data report, as found in USFS 2001) was used to describe
33 aquatic habitat in the lower McCloud River and to assess the changes in aquatic
34 habitat from implementation of the Shasta Dam modification alternatives. The
35 habitat typing data were used in conjunction with the CalSim-II modeling
36 results, digitized orthophotographs, and high-resolution topographic data to
37 provide habitat maps and graphic depictions of the distribution of aquatic
38 habitat in the lower river below Little Bollibokka Creek. A longitudinal profile,
39 using water surface elevations, was generated to illustrate habitats; it does not
40 provide an accurate representation of channel geometry.

1 A quantitative evaluation of the aquatic habitats was performed using digital
2 images and the USFS habitat typing data in an integrated geographic
3 information systems environment. Longitudinal habitat delineation was
4 determined from the habitat typing data, with minor adjustments to match
5 photo-interpreted habitat, and incorporated into the geographic information
6 systems in conjunction with water surface elevations generated through the
7 CalSim-II modeling results. Estimates of aquatic habitat areas were generated
8 from digitized wetted stream perimeters. These measurements were based on
9 orthophotographs taken April 25, 2001. While the absolute amount of riverine
10 habitat can vary with flow, the relative proportions of different types of habitat
11 remain relatively constant. Therefore, we used the relative proportions of
12 aquatic habitat types to compare impacts to the transition reach with the entire
13 lower river.

14 **25.4.2 Criteria for Determining Significance of Effects**

15 The following significance criteria were developed based on guidance provided
16 by the State CEQA Guidelines, other Federal and State guidance, and consider
17 the context and intensity of the environmental effects as required under NEPA.
18 (Please see Chapter 3, “Considerations for Describing the Affected
19 Environment and Environmental Consequences) for an explanation of the
20 distinction between significance under NEPA and significance under CEQA.)
21 Impacts of an alternative on the wild and scenic river values of the lower
22 McCloud River would be significant if project implementation would:

- 23 • Affect the eligibility for Federal listing as a wild and scenic river of any
24 portion of the lower McCloud River above the 1,070-foot elevation
- 25 • Conflict with the Shasta-Trinity National Forest Land and Resource
26 Management Plan or with management of the McCloud River under the
27 Coordinated Resource Management Plan
- 28 • Conflict with the protection provided the lower McCloud River under
29 the State PRC

30 **25.4.3 Direct and Indirect Effects**

31 ***No-Action Alternative***

32 Under the No-Action Alternative, Reclamation would not pursue an action to
33 enlarge Shasta Dam to help increase anadromous fish survival in the upper
34 Sacramento River and address the growing water supply reliability issues in
35 California. Water levels in Shasta Lake and the transition reach would continue
36 to fluctuate similar to current conditions. USFS Segment 4 and the Resources
37 Agency’s Segment 10 would not be affected by this alternative.

1 **Impact WASR-1 (No-Action): Effect on McCloud River’s Eligibility for**
2 **Listing as a Federal Wild and Scenic River** Under the No-Action

3 Alternative, the current maximum elevation of water levels in the transition
4 reach would not be increased, and Segment 4 would not be affected.
5 Fluctuations in water levels would continue to be similar to current conditions,
6 with water levels reaching the maximum elevation of 1,070 feet msl – the
7 downstream boundary of Segment 4 – in the transition reach for a brief period
8 (typically a few days in May) during wet years.

9 The average monthly water surface of Shasta Lake would continue to fluctuate
10 based on the water year, with a maximum elevation of 1,053 feet msl in April of
11 an average water year and 1,070 feet msl in April and May of a wet year. These
12 fluctuations would not affect the free-flowing conditions and water quality of
13 Segment 4. The ORVs that make the river eligible for designation as a Federal
14 wild and scenic river would continue to be affected only by ongoing natural
15 processes and land use activities, and all of Segment 4 would remain eligible for
16 listing under the Federal WSRA. Therefore, there would be no impact.
17 Mitigation is not required for the No-Action Alternative.

18 **Impact WASR-2 (No-Action): Conflict with Shasta-Trinity National Forest**
19 **Land and Resource Management Plan** Under the No-Action Alternative, the
20 STNF LRMP would continue to be implemented as it has in the past, with no
21 changes in the management of the McCloud River’s free-flowing condition,
22 water quality, and ORVs. Therefore, there would be no impact. Mitigation is not
23 required for the No-Action Alternative.

24 **Impact WASR-3 (No-Action): Conflict with the California Public**
25 **Resources Code, Section 5093.542—McCloud River Fishery** Under the No-
26 Action Alternative, the protections afforded the McCloud River by the State
27 PRC would not be affected. River conditions would not be modified, and the
28 provisions of the State PRC would continue to protect the river. Therefore, there
29 would be no impact. Mitigation is not required for the No-Action Alternative.

30 **Impact WASR-4 (No-Action): Conflict with the California Public**
31 **Resources Code, Section 5093.542—Free-Flowing Conditions** Under the
32 No-Action Alternative, the protections afforded the McCloud River by the State
33 PRC would not be affected. River conditions would not be modified, and the
34 provisions of the State PRC would continue to protect the river. Therefore, there
35 would be no impact. Mitigation is not required for the No-Action Alternative.

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

38 CP1 would involve a 6.5-foot raise of Shasta Dam, which would increase the
39 lake’s gross pool by 8.5 feet and enlarge the total storage space in the lake by
40 256,000 acre-feet. This increase would equate to an increase of about 1,100
41 acres of surface area occupied by Shasta Lake when the lake is full. CP1
42 includes measures to increase water supply reliability while contributing to

1 increased survival of anadromous fish. Shasta Dam operational guidelines
2 would continue essentially unchanged, except during dry years and critical
3 years, when 70 thousand acre-feet (TAF) and 35 TAF, respectively, of the
4 increased storage capacity in Shasta Reservoir would be reserved to specifically
5 focus on increasing municipal and industrial (M&I) deliveries.

6 **Impact WASR-1 (CP1): Effect on McCloud River's Eligibility for Listing**
7 **as a Federal Wild and Scenic River** Under CP1, the increased gross pool of
8 Shasta Lake would expand the current transition reach up to the 1,078-foot
9 elevation, resulting in adverse effects on the characteristics of approximately
10 1,470 feet of Segment 4. The rest of the McCloud River would remain eligible
11 for designation as a Federal wild and scenic river. This impact would be
12 significant.

13 Under CP1, approximately 1,470 feet, or 11 percent, of Segment 4 would be
14 periodically inundated. This increase in the transition reach to a maximum
15 elevation of 1,078 feet msl would equate to a 16 percent increase over the
16 current transition reach. The length of time during the year when the transition
17 reach is inundated and the maximum elevation of the inundation area would
18 vary by the type of water year (wet, above normal, below normal, average, dry,
19 or critical).

20 Within the expanded transition reach, flow conditions and fisheries would
21 periodically be affected, with the timing and duration of the effects similar to
22 those that occur in the current transition reach. Over time, the expansion of the
23 bathtub ring would affect water quality, geology, and visual quality/scenery in
24 the affected portion of Segment 4. Erosion of soils along the river could expose
25 buried cultural resources, and periodic inundation could permanently alter
26 cultural resource values and features in the transition reach important to Native
27 Americans. These effects could reduce the total length of the lower McCloud
28 River that is eligible for wild and scenic river designation by about 1,470 feet
29 (approximately 1.2 percent of the total length of the lower river).

30 *Free-Flowing Conditions* Under CP1, the currently free-flowing section of the
31 lower McCloud River would be reduced by about 1,470 feet or about 1.2
32 percent. The flow characteristics of the affected portion of Segment 4 would
33 periodically be modified, resulting in slower moving waters and a wider river
34 channel. When inundated, the affected portion would retain some current, but
35 flow velocities would decrease with distance downstream. This modification
36 would not meet the definition of a free-flowing river under the Federal WSRA.

37 Because free-flowing conditions are a fundamental requirement for wild and
38 scenic river eligibility, the 1,470-foot reach of Segment 4 that would be affected
39 by CP1 would become ineligible for listing under the Federal WSRA.

40 *Water Quality* As Shasta Lake's water levels rise, vegetation and soils along
41 the banks of the affected portion of Segment 4 would become inundated. Most

1 or all of the vegetation that is inundated would eventually die and be washed or
2 fall into the river, bringing with it sediment and other materials that could affect
3 water quality. Soils in the affected portion of Segment 4 would erode as water
4 levels rise and fall, causing an increase in turbidity. These effects would likely
5 be most noticeable during the initial inundation periods, since the river corridor
6 is likely to eventually stabilize as the soil is eroded to bedrock.

7 Within the approximately 1,470-foot reach of Segment 4 that would be affected
8 under CP1, water temperatures would fluctuate relative to temperatures
9 immediately upstream. Similar to flow, these changes would vary by water year
10 type. Increased turbidity and warmer water temperatures would be most
11 noticeable along the affected portion of Segment 4 because this area has not
12 been previously exposed to periodic inundations.

13 Adverse effects on water quality would be associated with the periodic
14 fluctuations in the water levels of Shasta Lake. Because water quality is a
15 fundamental requirement for wild and scenic river eligibility, the 1,470-foot
16 reach of Segment 4 that would be affected by CP1 would become ineligible for
17 listing under the Federal WSRA.

18 *Outstandingly Remarkable Values* As described above under Affected
19 Environment, the ORVs that make Segment 4 of the McCloud River eligible for
20 listing as a wild and scenic river are cultural/historical resources, fisheries,
21 geology, and visual quality/scenery.

22 *Cultural/Historical Resources* Under CP1, erosion of rock outcrops and
23 expansion of the bathtub ring in an approximately 1,470-foot reach of Segment
24 4 could expose buried or previously undiscovered prehistoric cultural resources
25 associated with Wintu occupation of the area and historic recreational uses of
26 the area. As this reach becomes inundated, any exposed resources would be
27 susceptible to the effects of water, which could damage or otherwise alter their
28 values, affecting their eligibility for listing on the National Register of Historic
29 Places and reducing their importance for providing information on past use
30 within the corridor. As the water recedes, exposed resources would be
31 susceptible to wind and rain and could be visible, potentially exposing them to
32 theft or vandalism. These adverse effects would be localized along the corridor
33 of the affected portion of Segment 4 and would likely only affect a small
34 portion of the cultural resources that may be associated with the lower McCloud
35 River basin.

36 The historic structures associated with the Bollibokka Club occur outside of the
37 area that would be affected by the expanded transition reach and would not be
38 affected. However, unrecorded resources associated with the Wintu village
39 locations may occur within the corridor along the river and could be subjected
40 to periodic inundation, deposition, and scour within the upper portions of the
41 expanded transition reach. Portions of three other recorded sites could also be
42 subject to similar impacts within the expanded transition reach, which could

1 result in damage to resources within the sites. Although these sites may provide
2 information on the area's history or prehistory, none of these sites has been
3 evaluated for listing on the National Register of Historic Places.

4 Sacred sites important to Native Americans have not been specifically
5 identified, and access to lands adjacent to the reach that would be periodically
6 inundated under CP1 is limited because all of these lands are privately owned.

7 The cultural resources located along the 1,470-foot reach of Segment 4 that
8 would be affected under CP1 would be subject to the effects of periodic
9 inundation.

10 *Fisheries* Aquatic habitat in the 1,470-foot expansion of the transition
11 reach would be affected during periodic inundations, resulting in potential
12 adverse effects on the fish that occur in the river. Potential adverse effects on
13 fish could include a reduction in spawning habitat for trout in the expanded
14 transition reach and an increase in the range of warmwater fish in the lower
15 McCloud River. Fishing opportunities would not be affected more than they are
16 now with the periodic fluctuations in river levels.

17 Under CP1, the transition reach would be extended by about 1,470 feet to the
18 1,078-foot elevation, resulting in a larger inundation area when Shasta Lake
19 water levels are the highest. Aquatic habitat in the affected portion of Segment 4
20 consists primarily of flatwater habitat (52 percent glide, 19 percent mid-channel
21 pool, and 13 percent run), with pocket water (11 percent) and a small, low-
22 gradient riffle (5 percent) in the lower portion of the segment. With the periodic
23 inundations, sediment deposition could cause flatwater habitat to convert to
24 riffle habitat, resulting in a reduction in flatwater habitat of less than 3 percent
25 of the total lower McCloud River's flatwater habitat. During the inundation
26 period, riffle and pool habitat (approximately 1.2 percent of the total lower
27 McCloud River) would be converted to flatwater habitat. Also, riparian
28 vegetation along the newly inundated banks of the affected portion of Segment
29 4 would be expected to die, which could affect water temperatures and reduce
30 cover for fish in this reach. The extent of these effects would depend on the
31 frequency, duration, and surface elevation of the inundation, which would vary
32 depending on the type of water year and water levels of Shasta Lake.

33 The migration of fish, especially trout, between the lower McCloud River and
34 Shasta Lake is an important attribute of the unique trout fishery. Many of the
35 rainbow and brown trout that occupy the lower McCloud River spend part of
36 their lives rearing in Shasta Lake, feeding on the abundant prey in the lake and
37 attaining large sizes that would not be possible if they reared only in the river.
38 Upon returning to the river to spawn, these lake-reared fish provide the trophy-
39 sized trout, particularly brown trout, for which the lower McCloud River is
40 renowned (Rode and Dean 2004). Based on a survey that extended up to Tuna
41 Falls (North State Resources, Inc. 2008), the reach of Segment 4 that would
42 periodically be inundated does not contain any barriers or impediments to fish

1 movement or migration, and CP1 would not create any. Consequently, trout
2 migration through the transition reach to upstream spawning areas would not be
3 impaired.

4 Conversely, warmwater fish movement between the lake and river is not likely
5 to be facilitated by the expanded transition reach. Warmwater fish from Shasta
6 Lake, such as spotted bass, have been observed throughout the lower McCloud
7 River, at least up to the confluence with Tuna Creek (North State Resources,
8 Inc. 2008). Nonnative warmwater species inhabiting Shasta Lake (e.g.,
9 smallmouth bass and spotted bass) are known to exploit riverine and transitional
10 habitats and are effective predators of juvenile trout. No barriers have been
11 observed in the transition reach that could prevent warmwater fish from moving
12 upstream, and no barriers would be created by the expansion of the transition
13 reach. Warmwater fish would continue to be able to move between the lake, the
14 transition reach, and lower McCloud River (Segment 4).

15 Aquatic habitat changes could affect how fluvial resident trout use habitat
16 within the affected portion of Segment 4. General effects may range from
17 temporary displacement of trout to upstream habitats at high water levels to
18 degraded riverine habitat suitability within the transition reach.

19 Suitable spawning habitat for rainbow and brown trout in the expanded
20 transition reach is limited because of the few pools and riffles available during
21 the spring and fall when these species spawn. Based on the USFS habitat data
22 and more recent reconnaissance surveys, the amount of spawning gravels in the
23 expanded transition reach represents only a small percentage of the suitable
24 spawning habitat in the lower McCloud River. However, any effect on
25 spawning habitat would be considered adverse.

26 *Geology* During periods of maximum inundation in the 1,470-foot
27 portion of Segment 4 that would be affected under CP1, some rock outcrops
28 may become inundated and could erode, but the overall geologic value of the
29 McCloud Limestone features would not be adversely affected.

30 *Visual Quality/Scenery* The visual quality of the affected portion of
31 Segment 4 would decrease as the vegetation along the banks becomes inundated
32 and eventually dies, the bathtub ring expands, and evidence of flow is reduced.
33 These conditions would be similar to those in the current transition reach. The
34 affected portion of Segment 4 would no longer have the qualities that
35 contributed to its classification by the USFS as “scenic.”

36 CP1 would result in making approximately 1,470 feet of the lower McCloud
37 River ineligible for listing as wild and scenic. This impact would be significant.
38 Mitigation for this impact is not currently available. Additional studies will be
39 conducted to determine if feasible mitigation measures could be developed.
40 Since no mitigation is currently available, this impact would be significant and
41 unavoidable.

Impact WASR-2 (CP1): Conflict with Shasta-Trinity National Forest Land and Resource Management Plan

The inundation of approximately 1,470 feet of Segment 4 would not conflict with the provisions in the STNF Land and Resource Management Plan to protect the ORVs that make the McCloud River eligible for listing under the Federal WSRA. Although raising Shasta Dam would result in inundation of part of Segment 4, the McCloud River and the adjoining lands in this part of the segment are not National Forest System lands and therefore not subject to the LRMP. Management of the river's ORVs under the STNF LRMP and the CRMP would not be affected. No land use changes would occur along the river, and the USFS and signatories to the CRMP would be able to continue implementing provisions of their plans that apply to the river. Because the LRMP does not apply to the private lands in Segment 4, there would be no impact and no mitigation is required.

Impact WASR-3 (CP1): Conflict with the California Public Resources Code, Section 5093.542—McCloud River Fishery The State PRC includes provisions that protect the McCloud River fishery with an emphasis on wild trout. Implementation of proposed modifications to Shasta Dam and Shasta Lake could conflict with this element of the State PRC.

The proposed modifications to Shasta Dam and Shasta Lake would result in temporary and periodic fluctuations in water levels within the expanded transition reach, affecting about 1.2 percent of the lower McCloud River and its associated fishery habitat. Under CP1, the transition reach would be extended by about 1,470 feet, a 16 percent increase over the current transition reach; this entire area would be inundated only during peak water levels in the spring of wet years. The primary impact of the expansion of the transition reach would be conversion of aquatic habitat in a manner similar to that described under Impact WASR-1 and Impact WASR-2 and comparable to the habitat conversion that can be observed in the current transition reach downstream. While the overall impacts to the fishery (populations and habitat) are small in the context of the entire lower McCloud River, the impacts would conflict with the State PRC. This impact would be potentially significant. Mitigation for this impact is not currently available; however, ongoing efforts to develop and implement the Comprehensive Mitigation Strategy described in Chapter 2 are focusing on identifying and developing feasible mitigation measures to reduce this impact. Since mitigation for this impact is currently under development, the significance after mitigation has not yet been determined.

Impact WASR-4 (CP1): Conflict with the California Public Resources Code, Section 5093.542—Free-Flowing Conditions The State PRC includes provisions that protect the free-flowing conditions of the McCloud River. Implementation of proposed modifications to Shasta Dam and Shasta Lake could conflict with this element of the State PRC.

The proposed modifications to Shasta Dam and Shasta Lake would result in temporary and periodic fluctuations in water levels within the expanded

1 transition reach, affecting about 1.2 percent of the lower McCloud River. Under
2 CP1, the transition reach would be extended by about 1,470 feet, a 16 percent
3 increase over the current transition reach; this entire area would be inundated
4 only during peak water levels in the spring of wet years. The free-flowing
5 conditions of the river would not be adversely affected beyond the upstream
6 extension of the transition reach. The primary impact of the expansion of the
7 transition reach would be modifications to the free-flowing character in a
8 manner similar to that described under Impact WASR-1 and Impact WASR-2.
9 While the overall impacts to the free-flowing conditions that would occur
10 within this transition reach are small in the context of the lower McCloud River
11 (1.2 percent), the impacts would conflict with the State PRC. This impact would
12 be significant. Mitigation for this impact is not currently available. Additional
13 studies will be conducted to determine if feasible mitigation measures could be
14 developed. Since no mitigation is currently available, this impact would be
15 significant and unavoidable.

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

18 CP2 would involve a 12.5-foot raise of Shasta Dam, which would increase the
19 lake's gross pool by 14.5 feet and enlarge the total storage space in the lake by
20 443,000 acre-feet. This increase would equate to an increase of about 1,850
21 acres of surface area when the lake is full. CP2 also includes measures to
22 increase water supply reliability while contributing to increased survival of
23 anadromous fish. Shasta Dam operational guidelines would continue essentially
24 unchanged, except during dry years and critical years, when 120 TAF and 60
25 TAF, respectively, of the increased storage capacity in Shasta Reservoir would
26 be reserved to specifically focus on increasing M&I deliveries. CP2 would help
27 reduce future water shortages through increasing drought year and average year
28 water supply reliability for agricultural and M&I deliveries. In addition, the
29 increased depth and volume of the cold-water pool in Shasta Reservoir would
30 contribute to improving seasonal water temperatures for anadromous fish in the
31 upper Sacramento River.

32 **Impact WASR-1 (CP2): Effect on McCloud River's Eligibility for Listing**
33 **as a Federal Wild and Scenic River** Impact WASR-1 (CP2) would be similar
34 to Impact WASR-1 but would affect 1270 feet more of Segment 4 than CP1.
35 Implementation of CP2 would reduce the total length of the McCloud River that
36 is eligible for wild and scenic river designation by about 2,740 feet
37 (approximately 2.3 percent of the total length of the lower river). The rest of the
38 lower McCloud River would remain eligible for listing.

39 Under CP2, approximately 2,740 feet, or 21 percent, of Segment 4 would be
40 periodically inundated. The transition reach would increase to a maximum
41 elevation of 1,084 feet msl, which would extend it by about 2,740 feet (a 30
42 percent increase over the current transition reach), inundating a larger portion of
43 the lower McCloud River within the study area and Segment 4. The inundated
44 area would increase to approximately 51 total acres (an increase of 18 acres

1 over existing conditions and 9 acres more than CP1 conditions), with a
2 maximum width of approximately 530 feet (an increase of 60 feet over existing
3 conditions) and a total length of approximately 11,740 linear feet (2.22 miles).
4 The extension of the transition reach by approximately 2,740 feet would affect
5 approximately 21 percent of Segment 4. Additional impacts under CP2
6 compared with CP1 would be minimal and would be limited to the additional
7 440-foot extension of the transition reach and about 15 additional feet on both
8 sides of the river.

9 During a wet year, the maximum average water surface elevation of Shasta
10 Lake would be 1,080 feet msl, with a peak elevation of 1,084 feet msl during
11 May. This is an increase of 15 feet above the existing maximum average.
12 During an average water year, the maximum average water surface elevation
13 would increase to 1,051 feet msl, an increase of 11 feet above existing
14 conditions. During dry and critical water years, the change would be on the
15 order of 5 to 9 feet in elevation.

16 The increased gross pool of Shasta Lake would expand the current transition
17 reach up to the 1,084-foot elevation, a 30 percent increase. Flow conditions and
18 fisheries in the 2,740-foot reach of Segment 4 would periodically be affected,
19 with the timing and duration of the effects similar to those in the current
20 transition reach. Over time, the expansion of the bathtub ring would adversely
21 affect water quality, geology, and visual quality/scenery. Erosion of soils along
22 the river could expose buried cultural resources, and periodic inundation could
23 permanently alter cultural resource values and features in the transition reach
24 important to Native Americans.

25 *Free-Flowing Conditions* As discussed under Impact WASR-1 (CP1), the flow
26 characteristics of the extended transition reach under CP2 would be periodically
27 modified, resulting in slower moving waters and a wider river channel. This
28 modification would not meet the definition of a free-flowing river under the
29 Federal WSRA. The width of the transition reach would be increased by
30 approximately 30 feet on both sides of the river. Flow conditions and the river's
31 free-flowing nature upstream from the expanded transition reach would remain
32 similar to current conditions.

33 Because free-flowing conditions are a fundamental requirement for wild and
34 scenic river eligibility, the 2,740-foot reach of Segment 4 that would be affected
35 by CP2 would become ineligible for listing under the Federal WSRA.

36 *Water Quality* Under CP2, increased turbidity and warmer water temperatures
37 would be most noticeable along the expanded 2,740 feet of the transition reach
38 and in the 30-foot corridor on either side of the transition reach because these
39 areas have not been previously exposed to periodic inundations. As discussed
40 under Impact WASR-1 (CP1), effects on water quality would be associated with
41 the periodic increases in water levels of Shasta Lake.

1 Because water quality is a fundamental requirement for wild and scenic river
2 eligibility, the 2,740-foot reach of Segment 4 that would be affected by CP2
3 would become ineligible for listing under the Federal WSRA.

4 *Outstandingly Remarkable Values* As described above under Affected
5 Environment, the ORVs that make Segment 4 of the McCloud River eligible for
6 listing as a wild and scenic river are cultural/historical resources, fisheries,
7 geology, and visual quality/scenery.

8 *Cultural/Historical Resources* Impacts would be the same as discussed
9 under Impact WASR-1 (CP1); however, a slightly larger portion of the three
10 recorded sites and possible resources associated with the known Wintu villages
11 would be inundated.

12 The cultural resources located along the 2,740-foot reach of Segment 4 that
13 would be affected under CP2 would be subject to the effects of periodic
14 inundation.

15 *Fisheries* Aquatic habitat in the affected 2,740-foot segment consists of
16 pocket water and a lateral scour pool. The potential conversion of flatwater
17 habitat to riffle habitat in the 2,740-foot segment would be similar to but greater
18 than under WASR-1 (CP1), and overall impacts to aquatic habitat and fish
19 would be similar to those discussed under Impact WASR-1 (CP1).

20 *Geology* Impacts would be the same as discussed under Impact WASR-1
21 (CP1); the geologic values of the lower McCloud River would not be adversely
22 affected.

23 *Visual Quality/Scenery* Impacts would be the same as discussed under
24 Impact WASR-1 (CP1). The affected portion of Segment 4 would no longer
25 have the qualities that contributed to its classification by the USFS as “scenic.”

26 CP2 would result in making approximately 2,740 feet of the lower McCloud
27 River ineligible for listing as wild and scenic. This impact would be significant.
28 Mitigation for this impact is not currently available. Additional studies will be
29 conducted to determine if feasible mitigation measures could be developed.
30 Since no mitigation is currently available, this impact would be significant and
31 unavoidable.

32 **Impact WASR-2 (CP2): Conflict with Shasta-Trinity National Forest Land**
33 **and Resource Management Plan** The inundation of approximately 2,740 feet
34 of Segment 4 would not conflict with the provisions in the STNF Land and
35 Resource Management Plan to protect the ORVs that make the McCloud River
36 eligible for listing under the Federal WSRA. There would be no impact, and no
37 mitigation is required.

38 **Impact WASR-3 (CP2): Conflict with the California Public Resources**
39 **Code, Section 5093.542 —McCloud River Fishery** The impact would be

1 similar to WASR-3 (CP1) but the magnitude of the impact would be greater
2 under CP2 because of the longer transition reach. Under CP2, the proposed
3 modifications to Shasta Dam and Shasta Lake would result in temporary and
4 periodic fluctuations in water levels within the expanded transition reach,
5 affecting about 2.3 percent of the lower McCloud River. Under CP2, the reach
6 affected by Shasta Lake water levels would be extended by about 2,740 feet, a
7 30 percent increase over the current transition reach; this entire area would be
8 inundated only during peak water levels in the spring of wet years. The primary
9 impact of the expansion of the transition reach would be conversion of aquatic
10 habitat in a manner similar to the habitat conversion that can be observed in the
11 current transition reach downstream. While the overall impacts to the fishery
12 (populations and habitat) are small in the context of the entire lower McCloud
13 River, the impacts would conflict with the State PRC. This impact would be
14 potentially significant. Mitigation for this impact is not currently available;
15 however, ongoing efforts to develop and implement the Comprehensive
16 Mitigation Strategy described in Chapter 2 are focusing on identifying and
17 developing feasible mitigation measures to reduce this impact. Since mitigation
18 for this impact is currently under development, the significance after mitigation
19 has not yet been determined.

20 **Impact WASR-4 (CP2): Conflict with the California Public Resources**
21 **Code, Section 5093.542—Free-Flowing Conditions** The impact would be
22 similar to WASR-4 (CP1) but the magnitude of the impact would be greater
23 under CP2 because of the longer transition reach. Under CP2, the proposed
24 modifications to Shasta Dam and Shasta Lake would result in temporary and
25 periodic fluctuations in water levels within the expanded transition reach,
26 affecting about 2.3 percent of the lower McCloud River. Under CP2, the reach
27 affected by Shasta Lake water levels would be extended by about 2,740 feet, a
28 30 percent increase over the current transition reach; this entire area would be
29 inundated only during peak water levels in the spring of wet years. The free-
30 flowing conditions of the river would not be adversely affected beyond the
31 upstream extension of the transition reach. While the overall impacts to the free-
32 flowing conditions that would occur within this transition reach are small in the
33 context of the lower McCloud River (2.3 percent), the impacts would conflict
34 with the State PRC. This impact would be significant. Mitigation for this impact
35 is not currently available. Additional studies will be conducted to determine if
36 feasible mitigation measures could be developed. Since no mitigation is
37 currently available, this impact would be significant and unavoidable.

38 ***CP3, 4, 5 – 18.5-Foot Dam Raise, with Variations***

39 CP3, CP4, and CP5 would involve an 18.5-foot raise of Shasta Dam, which
40 would increase the lake's gross pool by 20.5 feet and enlarge the total storage
41 space in the lake by 634,000 acre-feet. This increase would equate to an
42 increase of about 2,500 acres of surface area when the lake is full. CP3, CP4,
43 and CP5 include variations in measures to increase water supply reliability
44 while contributing to increased survival of anadromous fish.

1 CP3 involves measures to increase agricultural water supply reliability and
2 survival of anadromous fish. Because CP3 focuses on increasing agricultural
3 water supply reliability, none of the increased storage capacity in Shasta
4 Reservoir would be reserved for increasing M&I deliveries. Operations for
5 water supply, hydropower, and environmental and other regulatory
6 requirements would be similar to existing operations, with the additional storage
7 retained for water supply reliability and to expand the cold-water pool for
8 downstream anadromous fisheries.

9 CP4 would be used to improve the ability to meet temperature objectives and
10 habitat requirements for anadromous fish during drought years and increase
11 water supply reliability. Of the increased reservoir storage space under CP4,
12 about 378,000 acre-feet would be dedicated to increasing the supply of cold
13 water for anadromous fish survival purposes. For CP4, operations for the
14 remaining portion of increased storage (approximately 256,000 acre-feet) would
15 be the same as in CP1, with 70 TAF and 35 TAF reserved to specifically focus
16 on increasing M&I deliveries during dry and critical years, respectively. CP4
17 includes augmenting spawning gravel and restoring riparian, floodplain, and
18 side channel habitat in the upper Sacramento River.

19 CP5 would help reduce future water shortages through increasing drought year
20 and average year water supply reliability for agricultural and M&I deliveries.
21 Shasta Dam operational guidelines would continue essentially unchanged,
22 except during dry years and critical years, when 150 TAF and 75 TAF,
23 respectively, of the increased storage capacity in Shasta Reservoir would be
24 reserved to specifically focus on increasing M&I deliveries. CP5 also includes
25 constructing additional fish habitat in and along the shoreline of Shasta Lake
26 and along the lower reaches of its tributaries; augmenting spawning gravel and
27 restoring riparian, floodplain, and side channel habitat in the upper Sacramento
28 River; and increasing recreation opportunities at Shasta Lake.

29 Impacts associated with CP3, CP4, and CP5 would be very similar to those
30 described for CP1 and CP2, but the increased water levels of Shasta Lake would
31 affect a longer reach of the lower McCloud River. Because of their similarities,
32 and in an effort to reduce redundancy, only the differences between the plans
33 are described below.

34 **Impact WASR-1 (CP3, 4, 5): Effect on McCloud River's Eligibility for**
35 **Listing as a Federal Wild and Scenic River** Implementation of CP3, CP4,
36 and CP5 would reduce the total length of the McCloud River that is eligible for
37 wild and scenic river designation by about 3,550 feet (less than 3 percent of the
38 total length of the lower river). The rest of the lower McCloud River would
39 remain eligible for listing.

40 Under CP3, 4, and 5, the extent of the transition reach would increase to a
41 maximum elevation of 1,090 feet msl, which would extend the current transition
42 reach by about 3,550 feet (a 39 percent increase over the current transition

1 reach), inundating a larger portion of the lower McCloud River within the study
2 area and Segment 4. The inundated area would increase to approximately 60
3 total acres (an increase of 27 acres over existing conditions, and 9 acres more
4 than CP2 conditions), with a maximum width of approximately 610 feet (an
5 increase of 140 feet over existing conditions) and a total length of
6 approximately 12,550 linear feet (2.38 miles). The extension of the transition
7 reach by approximately 3,550 feet would affect approximately 26 percent of
8 Segment 4. Additional impacts under CP3, 4, and 5 compared with CP1 and
9 CP2 would be minimal and would be limited to the additional 810-foot
10 extension of the transition reach and about 20 additional feet on either side of
11 the river.

12 During a wet year, the maximum average water surface elevation of Shasta
13 Lake would be 1,086 feet msl, with a peak elevation of 1,090 feet msl during
14 May. This is an increase of 21 feet above the existing maximum average.
15 During an average water year, the maximum average water surface elevation
16 would increase to 1,054 feet msl, an increase of 14 feet above existing
17 conditions. During dry and critical water years, the change would be on the
18 order of 6 to 13 feet in elevation.

19 The increased gross pool of Shasta Lake would expand the current transition
20 reach by approximately 3,550 feet (810 feet beyond CP2's effects) up to the
21 1,090-foot elevation, resulting in a 39 percent increase in the transition reach.
22 Within the expanded transition reach, flow conditions and fisheries would
23 periodically be affected, with the timing and duration of the effects similar to
24 those in the current transition reach. Over time, the expansion of the bathtub
25 ring would affect water quality, geology, and visual quality/scenery. Erosion of
26 soils along the river could expose buried cultural resources, and periodic
27 inundation could permanently alter cultural resource values and features in the
28 transition reach important to Native Americans.

29 *Free-Flowing Conditions* As discussed under Impact WASR-1 (CP1), the flow
30 characteristics of the extended transition reach under CP3, CP4, and CP5 would
31 be temporarily modified, resulting in slower moving waters and a wider river
32 channel. This modification would not meet the definition of a free-flowing river
33 under the Federal WSRA. The width of the transition reach would be increased
34 by approximately 70 feet on either side of the river. Flow conditions and the
35 river's free-flowing nature upstream from the expanded transition reach would
36 remain similar to current conditions.

37 Because free-flowing conditions are a fundamental requirement for wild and
38 scenic river eligibility, the 3,550-foot reach of Segment 4 that would be affected
39 by CP1 would become ineligible for listing under the Federal WSRA.

40 *Water Quality* Under CP3, 4, and 5, increased turbidity and warmer water
41 temperatures would be most noticeable along the expanded 3,550-foot reach of
42 the transition reach and in the 70-foot corridor on either side of the transition

1 reach because these areas have not been previously exposed to periodic
2 inundations. Under these plans, the wider affected river corridor could result in
3 greater temporary effects on water quality because more vegetation would be
4 temporarily inundated and more soils would be exposed. As discussed under
5 Impact WASR-1 (CP1), effects on water quality would be associated with the
6 periodic increases in water levels of Shasta Lake.

7 Because water quality is a fundamental requirement for wild and scenic river
8 eligibility, the 3,550-foot reach of Segment 4 that would be affected by CP3,
9 CP4, and CP5 would become ineligible for listing under the Federal WSRA.

10 *Outstandingly Remarkable Values* As described above under Affected
11 Environment, the ORVs that make Segment 4 of the McCloud River eligible for
12 listing as a wild and scenic river are cultural/historical resources, fisheries,
13 geology, and visual quality/scenery.

14 *Cultural/Historical Resources* Impacts would be similar to those
15 discussed under Impact WASR-1 (CP1). Under CP3, CP4, and CP5, the wider
16 affected river corridor could result in greater effects on cultural resources
17 because of the wider inundated area and increased erosion. Larger portions of
18 the three recorded sites and known Wintu villages would become inundated.

19 The cultural resources located along the 3,550-foot reach of Segment 4 that
20 would be affected under CP3, CP4, and CP5 would be subject to the effects of
21 periodic inundation.

22 *Fisheries* Aquatic habitat in the additional 810-foot segment under CP3,
23 CP4, and CP5 consists of a mid-channel pool and a lateral scour pool. The
24 potential conversion of flatwater habitat to riffle habitat in the 3,550-foot reach
25 of Segment 4 that would be affected under these plans be similar to but greater
26 than under WASR-1 (CP1), and overall impacts to aquatic habitat and fish
27 would be similar to those discussed under Impact WASR-1 (CP1).

28 *Geology* Impacts would be the same as discussed under Impact WASR-1
29 (CP1), except additional rock outcrops could become inundated because of the
30 wider affected corridor.

31 *Visual Quality/Scenery* Impacts would be similar to those discussed
32 under Impact WASR-1 (CP1). Under these plans, the wider affected river
33 corridor could result in greater effects on the visual setting because of the wider
34 inundated area and increased impacts on vegetation. The water line would also
35 be visible at a higher elevation and could be more noticeable. The affected
36 portion of Segment 4 would no longer have the qualities that contributed to its
37 classification by the USFS as “scenic.”

38 CP3, 4, and 5 would result in making approximately 3,550 feet of the lower
39 McCloud River ineligible for listing as wild and scenic. This impact would be
40 significant. Mitigation for this impact is not currently available. Additional

1 studies will be conducted to determine if feasible mitigation measures could be
2 developed. Since no mitigation is currently available, this impact would be
3 significant and unavoidable.

4 **Impact WASR-2 (CP3, 4, 5): Conflict with Shasta-Trinity National Forest**
5 **Land and Resource Management Plan** The inundation of approximately
6 3,550 feet of Segment 4 would not conflict with the provisions in the STNF
7 Land and Resource Management Plan to protect the ORVs that make the
8 McCloud River eligible for listing under the Federal WSRA. There would be no
9 impact, and no mitigation is required.

10 **Impact WASR-3 (CP3, 4, 5): Conflict with the California Public Resources**
11 **Code, Section 5093.542—McCloud River Fishery** The impact would be
12 similar to WASR-3 (CP1), but the magnitude of the impact would be greater
13 under CP3, CP4, and CP5 because of the longer transition reach. Under CP3,
14 CP4, and CP5, the proposed modifications to Shasta Dam and Shasta Lake
15 would result in temporary and periodic fluctuations in water levels within the
16 expanded transition reach, affecting about 3 percent of the lower McCloud
17 River. Under CP3, CP4, and CP5, the reach affected by Shasta Lake water
18 levels would be extended by about 3,550 feet, a 39 percent increase over the
19 current transition reach; this entire area would be inundated only during peak
20 water levels in the spring of wet years. The primary impact of the expansion of
21 the transition reach would be conversion of aquatic habitat in a manner similar
22 to the habitat conversion that can be observed in the current transition reach
23 downstream. While the overall impacts to the fishery (populations and habitat)
24 are small in the context of the entire lower McCloud River, the impacts would
25 conflict with the State PRC. This impact would be potentially significant.
26 Mitigation for this impact is not currently available; however, ongoing efforts to
27 develop and implement the Comprehensive Mitigation Strategy described in
28 Chapter 2 are focusing on identifying and developing feasible mitigation
29 measures to reduce this impact. Since mitigation for this impact is currently
30 under development, the significance after mitigation has not yet been
31 determined.

32 **Impact WASR-4 (CP3, 4, 5): Conflict with the California Public Resources**
33 **Code, Section 5093.542—Free-Flowing Conditions** The impact would be
34 similar to WASR-4 (CP1), but the magnitude of the impact would be greater
35 under CP3, CP4, and CP5 because of the longer transition reach. Under CP3,
36 CP4, and CP5, the proposed modifications to Shasta Dam and Shasta Lake
37 would result in temporary and periodic fluctuations in water levels within the
38 expanded transition reach, affecting about 3 percent of the lower McCloud
39 River. Under CP3, CP4, and CP5, the reach affected by Shasta Lake water
40 levels would be extended by about 3,550 feet, a 39 percent increase over the
41 current transition reach; this entire area would be inundated only during peak
42 water levels in the spring of wet years. The free-flowing conditions of the river
43 would not be adversely affected beyond the upstream extension of the transition
44 reach. The primary impact of the expansion of the transition reach would be

1 conversion of aquatic habitat in a manner similar to the habitat conversion that
2 can be observed in the current transition reach downstream. While the overall
3 impacts to the free flowing conditions that would occur within this transition
4 reach are small in the context of the lower McCloud River (3 percent), the
5 impacts would conflict with the State PRC. This impact would be significant.
6 Mitigation for this impact is not currently available. Additional studies will be
7 conducted to determine if feasible mitigation measures could be developed.
8 Since no mitigation is currently available, this impact would be significant and
9 unavoidable.

10 **25.4.4 Mitigation Measures**

11 Table 25-2 presents a summary of mitigation measures for wild and scenic
12 rivers.

13 No specific mitigation measures are proposed at this point in the planning
14 process. Ongoing efforts to develop and implement the Comprehensive
15 Mitigation Strategy described in Chapter 2 will focus on identifying and
16 determining if feasible mitigation measures could be developed and
17 implemented to reduce the impacts described under WASR-1, WASR-3 and
18 WASR-4 to less-than-significant levels.

1 **Table 25-2. Summary of Mitigation Measures for Wild and Scenic Rivers**

Impact		No-Action Alternative	CP1	CP2	CP3	CP4	CP5
Impact WASR-1: McCloud River's Eligibility for Listing as a Federal Wild and Scenic River	LOS before Mitigation	NI	S	S	S	S	S
	Mitigation Measure	None required.	No feasible mitigation available to reduce impact.				
	LOS after Mitigation	NI	SU	SU	SU	SU	SU
Impact WASR-2: Conflict with Shasta-Trinity National Forest, Land and Resource Management Plan	LOS before Mitigation	NI	NI	NI	NI	NI	NI
	Mitigation Measure	None required.	None required. .				
	LOS after Mitigation	NI	NI	NI	NI	NI	NI
Impact WASR-3: Conflict with California Public Resources Code, Section 5093.542 - McCloud River Fishery	LOS before Mitigation	NI	PS	PS	PS	PS	PS
	Mitigation Measure	None required.	Mitigation for this impact is under development.				
	LOS after Mitigation	NI	[TBD]	[TBD]	[TBD]	[TBD]	[TBD]
Impact WASR-4: Conflict with California Public Resources Code, Section 5093.542 - Free-Flowing Conditions	LOS before Mitigation	NI	S	S	S	S	S
	Mitigation Measure	None required.	No feasible mitigation available to reduce impact.				
	LOS after Mitigation	NI	SU	SU	SU	SU	SU

Key:
 CP = Comprehensive Plan
 LOS = level of significance
 NI = no impact
 PS = potentially significant
 S = significant
 SU = significant and unavoidable

2

3 **25.4.5 Topics Eliminated from Further Consideration**

4 No topics related to the eligibility of the McCloud River for listing under the
 5 Federal WSRA, the compatibility of the alternatives with the STNF LRMP or
 6 the CRMP, or their compatibility with the State PRC providing protection to the
 7 McCloud River were eliminated from further consideration.

8 **25.4.6 Cumulative Effects**

9 Significant effects were identified related to the compatibility of the project
 10 with the State PRC, Section 5093.542. The potential effects would be of greater
 11 magnitude and duration with the larger dam raises (i.e., CP3 through CP5 would
 12 have greater potential effects than CP1 and CP2). These impacts may also be
 13 associated with two reasonably foreseeable future actions that could affect the
 14 McCloud River: the relicensing of PG&E's McCloud-Pit Project and the pilot
 15 project to reintroduce anadromous salmonid populations upstream of Shasta
 16 Dam. FERC has issued the Final EIS for the relicensing of the McCloud-Pit

1 Project. However, the relicensing process for the McCloud-Pit Project is
2 ongoing, and the conditions that may be required under a new FERC license are
3 uncertain. The potential effects of the relicensing on the lower McCloud River
4 are therefore unknown. The 2009 NMFS Biological Opinion described in
5 Chapter 3 requires Reclamation to implement a pilot project that would provide
6 passage for anadromous salmonids upstream of Shasta Dam. This project could
7 reintroduce anadromous salmonids to the lower McCloud River. At this point in
8 the planning process, the details of this project are ill-defined and the potential
9 for success is uncertain. Therefore, the potential effects of this future action on
10 the lower McCloud River are unknown. Given the information available on
11 these future actions, the potential for project-related impacts to be cumulatively
12 considerable would be less than significant and could, in fact, result in benefits
13 to some of the values and resources of the lower McCloud River.

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Chapter 26

Other Required Disclosures

26.1 Significant Adverse Effects that Cannot be Avoided If a Project is Implemented

Section 21100(b)(2)(A) of CEQA requires an EIR to include a detailed statement setting forth “any significant effect on the environment that cannot be avoided if the project is implemented.” Chapters 4 through 25 of this DEIS analyze in detail all of the project’s potentially significant environmental impacts, including cumulative impacts; list feasible mitigation measures that could avoid, minimize, rectify, reduce or eliminate, or compensate for the project’s significant impacts; and specify whether these mitigation measures would reduce the impacts to a less-than-significant level. If no feasible mitigation measure is available to reduce a significant impact to a less-than-significant level, then the impact would be a significant and unavoidable impact.

After consideration of actions, operations, and features to avoid, mitigate, and/or compensate for adverse effects, the action alternatives would likely result in the following significant and unavoidable direct and indirect impacts:

- **Geology, Geomorphology, Minerals, and Soils** – Loss or diminished availability of known mineral resources that would be of future value to the region; lost or diminished soil biomass productivity; and substantial soil erosion or loss of topsoil due to shoreline processes (all action alternatives).
- **Air Quality and Climate** – Short-term emissions of criteria air pollutants and precursors at Shasta Lake and vicinity during project construction (all action alternatives).
- **Botanical Resource** – Loss of Multi-Species Conservation Strategy (MSCS) covered species; loss of USFS sensitive, U.S. Department of the Interior, Bureau of Land Management (BLM) sensitive, or California Rare Plant Rank (CRPR) species; loss of jurisdictional waters; and loss of general vegetation habitats (all action alternatives).
- **Wildlife Resources** – Take and loss of habitats for the Shasta salamander, bald eagle, northern spotted owl, and Pacific fisher; impact on the foothill yellow-legged frog, tailed frog, northwestern pond turtle, purple martin, special-status bats, American marten, ringtail, terrestrial

1 mollusks, and their habitat; impact on willow flycatcher, Vaux’s swift,
2 yellow warbler, yellow-breasted chat, long-eared owl, northern
3 goshawk, Cooper’s hawk, great blue heron, and osprey, and their
4 foraging and nesting habitat; permanent loss of general wildlife habitat;
5 take and loss of foraging and nesting habitat for other birds of prey and
6 migratory bird species; and loss of critical deer winter and fawning
7 range (all action alternatives).

8 • **Agriculture and Important Farmlands** – Direct and indirect
9 conversion of forest land to nonforest uses in the vicinity of Shasta
10 Lake (all action alternatives).

11 • **Land Use and Planning** – Conflicts with existing land use goals and
12 policies of affected jurisdictions (Shasta Lake and vicinity and upper
13 Sacramento River), and disruption of existing land uses (Shasta Lake
14 and vicinity and upper Sacramento River) (all action alternatives).

15 • **Cultural Resources** – Inundation of Traditional Cultural Properties
16 (all action alternatives).

17 • **Aesthetics and Visual Resources** – Degradation and/or obstruction of
18 a scenic view from key observation points, and generation of increased
19 daytime glare and/or nighttime lighting (all action alternatives).

20 • **Wild and Scenic River Considerations for McCloud River** – Effect
21 on McCloud River’s eligibility for listing as a Federal Wild and Scenic
22 River and conflicts with the California Public Resources Code, Section
23 5093.542 (all action alternatives).

24 The action alternatives could also result in the following significant and
25 unavoidable cumulative impacts (i.e., an impact would make a considerable
26 contribution to a significant cumulative effect):

27 • **Geology, Geomorphology, Minerals, and Soils** – Cumulative effects
28 from use of soil and mineral resources, leading to diminished regional
29 availability of cement, concrete sand, and aggregate and loss of soil
30 productivity (all action alternatives).

31 • **Air Quality and Climate** – Cumulative effects from emissions of
32 nitrogen oxide during project construction (all action alternatives).

33 • **Hydrology, Hydraulics, and Water Management** – Cumulative
34 effects on south Delta water levels, X2 position, and Delta outflow (all
35 action alternatives).

36 • **Botanical Resources and Wetlands** – Cumulative effects from
37 increased water delivery in the service areas and growth-related loss of

1 sensitive plant communities and special-status plant species (all action
2 alternatives).

- 3 • **Wildlife Resources** – Cumulative effects from inundation at Shasta
4 Lake, leading to take and loss of habitat for numerous special-status
5 species at Shasta Lake and vicinity (all action alternatives).
- 6 • **Cultural Resources** – Inundation of places of Native American
7 cultural significance (all action alternatives).
- 8 • **Aesthetics and Visual Resources** – Changes to aesthetic values and
9 resources at Shasta Lake (all action alternatives).
- 10 • **Environmental Justice** – Cumulative effects from disproportionate
11 placement of environmental impacts on Native American populations,
12 leading to disturbance or loss of resources associated with locations
13 considered by the Winnemem Wintu and Pit River Madesi Band
14 members to have religious and cultural significance in the vicinity of
15 Shasta Lake (all action alternatives).

16 Feasible mitigation will be implemented to reduce these impacts but would not
17 be sufficient to reduce these impacts to a less-than-significant level.

18 **26.2 Relationship of Short-Term Uses and Long-Term** 19 **Productivity**

20 NEPA requires consideration of “the relationship between short-term uses of
21 man’s environment and the maintenance and enhancement of long-term
22 productivity” (40 Code of Federal Regulations 1502.16). This involves using all
23 practicable means and measures, including financial and technical assistance, in
24 a manner calculated to: foster and promote the general welfare; to create and
25 maintain conditions under which man and nature can exist in productive
26 harmony; and fulfill the social, economic, and other requirements of present and
27 future generations of Americans.

28 All action alternatives analyzed in this DEIS would involve new construction,
29 such as raising Shasta Dam, replacing bridges, and relocating/reconstructing
30 recreational facilities and access roads adversely affected by higher reservoir
31 levels. Specific activities would modify the Pit River Bridge, modify/replace six
32 other bridges, relocate various recreation facilities, utilities and related
33 infrastructure, and inundate numerous small segments of existing paved and
34 unpaved roads. All of the action alternatives would result in indirect and
35 induced employment, which may support hiring in businesses that would
36 provide materials to the construction effort; in service-related industries that
37 would provide food, beverages, and other goods to construction workers; or in
38 more technical industries, such as consulting firms and other businesses (see

1 Chapter 16, “Socioeconomics, Population, and Housing”). Sales and profits for
2 businesses that support the construction industry in the primary study area
3 would increase over the 4.5- to 5-year construction period.

4 Potential habitat- and recreation-related losses caused by enlarging the dam and
5 reservoir would irreversibly affect habitats and developments near the dam
6 inundation area. Impacts on habitat areas within the dam inundation area would
7 be mitigated by preservation of similar habitats elsewhere. Construction
8 activities would include short-term uses of capital, labor, fuels, and construction
9 materials; habitats; and recreation areas. General commitments of construction
10 materials are largely irreversible because most construction materials are
11 unsalvageable.

12 Potential benefits of the action alternatives include an increase in water supply
13 reliability and a reduction in the probability of experiencing a potential flood-
14 related loss of resources, property, and human life. Environmental uses and
15 habitat for a variety of aquatic and terrestrial species along the Sacramento
16 River and waterways within the primary and extended study areas would be
17 maintained and potentially enhanced with the proposed mitigation. No adverse
18 effects would pose a long-term risk to health and safety.

19 **26.3 Irreversible and Irretrievable Commitments of Resources**

20 The State CEQA Guidelines require a discussion of the significant irreversible
21 environmental changes that would be caused by implementation of the proposed
22 project. In addition, an EIS prepared under NEPA must analyze irreversible and
23 irretrievable commitments of resources, such as soils, wetlands, waterfowl
24 habitat, and cultural resources (40 Code of Federal Regulations, Section
25 1502.16).

26 The irreversible and irretrievable commitment of resources is the permanent
27 loss of resources for future or alternative purposes. Irreversible and irretrievable
28 resources are those that cannot be recovered or recycled, or those that are
29 consumed or reduced to unrecoverable forms. The action alternatives would
30 result in the irreversible and irretrievable commitment of the following energy
31 and material resources during project construction and maintenance:

- 32 • Construction materials, including such resources as soil and rocks
- 33 • Land area committed to new/expanded project facilities and water
34 inundation areas
- 35 • Energy expended in the form of electricity, gasoline, diesel fuel, and oil
36 for equipment and transportation vehicles that would be needed for
37 project construction, operations, and maintenance

1 Nonrenewable resources are expected to account for a minimal portion of the
2 region's resources; the project's use of nonrenewable resources would not affect
3 the availability of these resources for other needs within the region.
4 Construction activities would not result in inefficient use of energy or natural
5 resources. The selected construction contractors would use best available
6 engineering techniques, construction and design practices, and equipment-
7 operating procedures. Furthermore, mitigation would be provided to offset any
8 loss of habitat areas and other land uses within the proposed dam inundation
9 areas. Long-term project operation would not result in substantial long-term
10 consumption of energy and natural resources, and increased energy production
11 would result from the additional storage capacity at Shasta Lake.

12 **26.4 Growth-Inducing Impacts**

13 CEQA requires that an EIR discuss how a project may induce growth. NEPA
14 requires that an EIS consider indirect effects of a project, which are often the
15 result of growth inducement. A project is considered potentially growth
16 inducing if it is reasonably foreseeable that the project may foster economic or
17 population growth or may result in the construction of additional housing
18 (California Code of Regulations, Section 15126.2(d)). The increase in water
19 supply reliability that would result from the construction of any of the proposed
20 action alternatives would be potentially growth inducing because it would foster
21 economic growth and potentially remove an obstacle to development.

22 The purpose of this section is to disclose how the action alternatives that are
23 analyzed in this DEIS could be growth inducing and to describe how the
24 potential resulting environmental effects would be addressed. In *Napa Citizens*
25 *for Honest Government v. Napa County Board of Supervisors* (2001) 91
26 Cal.App.4th 342, 367–371 [110 Cal.Rptr.2d 579], the California Court of
27 Appeal, Fourth District, provided clear direction on the standards for disclosure
28 of growth-inducing effects in an EIR that also is relevant to an EIS. The lead
29 agency also may consider mitigation measures for the anticipated effects.
30 Growth-inducing impacts are evaluated for the project alternatives in
31 accordance with the California Court of Appeal finding in *Napa Citizens for*
32 *Honest Government v. Napa County Board of Supervisors* (2001):

33 *Neither CEQA itself, nor the cases that have interpreted it,*
34 *require an EIR to anticipate and mitigate the effects of a*
35 *particular project on growth on other areas. In circumstances*
36 *such as these, it is sufficient that the final EIR (FEIR) warns*
37 *interested persons and governing bodies of the probability that*
38 *additional housing will be needed so that they can take steps to*
39 *prepare for or address that probability. The FEIR need not*
40 *forecast the impact that the housing will have on as yet*
41 *unidentified areas and propose measures to mitigate that*

1 Pumping Plant. Because of the potential influence of Shasta Dam modification
2 on natural resources along the Sacramento River as well as on other programs
3 and projects in the Central Valley, the project also evaluates an extended study
4 area that includes the Sacramento River basin downstream from Red Bluff
5 Pumping Plant, the American River basin, the Delta, the San Joaquin River
6 basin, and the CVP and SWP service areas.

7 The extended study area includes CVP and SWP reservoirs and the portions of
8 tributaries that are downstream from these reservoirs and affect the Sacramento
9 River, San Joaquin River, Trinity River, and Delta flows. These reservoirs and
10 tributaries include Lake Oroville, Folsom Lake, Millerton Lake, San Luis
11 Reservoir, New Melones Reservoir, and Trinity Lake, and portions of the
12 Trinity, Feather, American, and Stanislaus rivers. The CVP and SWP service
13 areas include much of the Sacramento and San Joaquin valleys, and substantial
14 portions of the Bay Area and Southern California.

15 The following sections describe mechanisms that could be growth inducing and
16 analyze potential growth-inducing effects of the action alternatives.

17 **26.4.1 Increased Construction Work**

18 The action alternatives would create new construction jobs in the primary study
19 area, but this temporary effect would not be growth inducing. Concrete workers,
20 workers with large-scale construction experience, general laborers, and others
21 would be drawn from the local construction industry. These jobs would
22 represent a relatively small increase (i.e., less than 0.5 percent) in the total labor
23 force in the two counties of the primary study area (Shasta and Tehama
24 counties), but also would represent a substantial increase in employment for
25 many of the cities surrounding the project, where employment has consistently
26 been below the state average (EDD 2010, 2011). Therefore, jobs created by the
27 action alternatives would be serviced by the local workforce and would not be
28 growth inducing (see Chapter 16, “Socioeconomics, Population, and Housing”).

29 **26.4.2 Increased Flood Risk Reduction**

30 The action alternatives also are anticipated to provide some flood risk reduction
31 benefits, but these benefits would not be growth inducing. The added reservoir
32 capacity at Shasta Lake would give Reclamation greater flexibility in using the
33 reservoir for flood management purposes, thereby increasing the threshold at
34 which seasonal heavy-rain events produce flood conditions downstream from
35 Shasta Dam. The benefits of this increase in reservoir capacity and related flood
36 management options would be most evident along the upper Sacramento River
37 in the primary study area, and would decrease downstream where other major
38 tributaries, such as the Feather and American Rivers, join the Sacramento River.
39 Structures in and inhabitants of this floodplain experience the most direct
40 effects from storage releases during flood events. The action alternatives would
41 reduce the frequency, magnitude, and duration of some potential future flood
42 events, like those that have affected structures and residents in this part of the
43 primary study area in the past.

1 As a result of the added reservoir capacity, the overall risk of flooding and its
2 related consequences below Shasta Dam is expected to be reduced. Although
3 heavy-rain events would continue to occur in the region, and potentially
4 increase as a result of global climate change, enlarging the dam is intended to
5 provide greater flexibility in flood management in the lower Sacramento River
6 and Delta area because of the increased capacity of the reservoir. As a result,
7 less damage to existing structures in or near the lower Sacramento River and
8 Delta floodplains would be expected over time although the probability of
9 certain flood events of a substantial size would not be decreased from the
10 increased reservoir capacity at Shasta Lake. Most importantly, the flood risk
11 reduction benefits of the dam enlargement would not change the existing
12 floodplain or Federal Emergency Management Agency flood zone designations,
13 so the action alternatives would not remove an obstacle to development or even
14 reduce any obstacles to development. Flood risk reduction benefits from any of
15 the action alternatives, therefore, are not growth inducing.

16 **26.4.3 Increased Water Supply Reliability**

17 Implementing any of the action alternatives would improve water supply
18 reliability in the primary and extended study areas. This improved water supply
19 reliability would better accommodate existing water contracts by increasing the
20 available water supply in some years. The environmental consequences of these
21 contracts have been (and in the future will be) evaluated in separate
22 environmental review processes. The improvement in water supply reliability
23 would not change long-term contract amounts or deliveries within their existing
24 historical ranges.

25 A variety of factors indirectly influence business, residential, and population
26 growth in the region. Among these are city and county general plans and
27 policies, and the availability of utility services, public schools, and
28 transportation services. Water is one of the primary public services needed to
29 support urban development, including businesses, industry (including
30 agriculture), and housing; a deficiency in water service capacity could constrain
31 future development.

32 Implementing any of the action alternatives also would increase water yield,
33 which would have the potential to be growth inducing. The expected increase in
34 water yield relative to the CVP and SWP service areas would be small (i.e., less
35 than 1 percent), and this new yield likely would be provided to a number of
36 geographic areas within the CVP and SWP service areas. Also, a substantial
37 portion of this water would substitute for groundwater pumping, would allow
38 for changes in agricultural irrigation practices, or would return idle cropland to
39 production. For this reason, implementing any of the action alternatives would
40 result in beneficial effects on agricultural resources, which would intrinsically
41 benefit the economies in the affected localities. An increase in the reliability of
42 water provided to agricultural areas would not necessarily lead to a direct
43 increase in population because the water primarily would service existing
44 agricultural lands and would not be expected to foster expansion into

1 undeveloped natural communities. Substantial acreages of existing agricultural
2 lands are idle because of reduced water reliability, and some of these existing
3 acreages would receive water and be put back into agricultural production.
4 However, the cumulative effect of a more reliable water source would be to
5 increase agricultural effectiveness, a key economic sector in the region, which
6 could indirectly result in growth-inducing impacts by bringing more money into
7 the local economies.

8 The proposed action alternatives would increase water supply reliability for
9 agricultural and/or municipal and industrial (M&I) uses. Agriculture is the most
10 important segment of the economy below Shasta Dam and throughout
11 California's Central Valley. Anticipated increases in agricultural water supply
12 reliability are based on simulated CVP and SWP irrigation deliveries. The
13 average annual increase in CVP and SWP irrigation deliveries under action
14 alternatives would be up to 62,200 acre-feet per year. Anticipated increases in
15 M&I water supply reliability are estimated based on simulated increases in CVP
16 and SWP M&I deliveries. The average annual increase in CVP and SWP M&I
17 deliveries under action alternatives would be up to 25,000 acre-feet per year.

18 Anticipated increases in total water supply reliability are based on the sum of
19 simulated increases in agricultural and M&I water supply reliability. Average
20 annual increases in total water supply reliability under action alternatives would
21 be up to 75,900 acre-feet per year. Therefore, the action alternatives would
22 result in increases in agricultural and/or M&I water supply reliability, which
23 potentially would be a growth-inducing effect.

24 If residential development is constrained by water supply, then increased water
25 supply reliability may remove an obstacle to residential development.
26 Therefore, any of the action alternatives potentially would be growth inducing.
27 Local land use authorities are required to demonstrate sufficient water supply
28 reliability, pursuant to Senate Bill 610 (Chapter 643, Statutes of 2001), in
29 addition to completion of a water supply evaluation required by CEQA. Water
30 supply reliability may be demonstrated with surface water, water contracts,
31 groundwater, and combinations thereof. Impacts on the physical environment
32 would be evaluated and mitigated at a project level. The locations of potential
33 residential development on existing agricultural or rangeland cannot be
34 predicted, and because of the speculative and amorphous nature of potential
35 growth-inducing impacts, no feasible mitigation for impacts of the action
36 alternatives is available at this time.

37 Increased reliability of the water supply could reduce a limitation on growth
38 throughout the primary and extended study areas; however, any project that
39 could affect natural resources or otherwise accommodate growth in the study
40 areas would have to comply with existing planning documents and would be
41 subject to project-specific public environmental analysis and review. The effects
42 of subsequent growth would be analyzed in general plan EIRs and in project-
43 level CEQA compliance documents for the local jurisdictions in which the

1 growth would occur. Mitigation of these potential effects would be the
2 responsibility of these local jurisdictions, not Reclamation.

3 In summary, the expected increase in water yield relative to the entire CVP
4 service area would be extremely small and could be provided to any number of
5 geographic areas within the CVP service area (and in part would substitute for
6 ongoing groundwater pumping). Water provided to agriculture would be used
7 primarily if not exclusively to return idle cropland to production. Furthermore,
8 it would be speculative to identify specific areas where growth could occur or
9 the indirect effects on specific community service facilities in a particular
10 service area. For these and other reasons specified above, the growth-inducing
11 effects from the action alternatives are limited, minimal, and can be effectively
12 mitigated through local jurisdictions as needed.

13 **26.5 Identification of Environmental Preferences for Action** 14 **Alternatives**

15 CEQ Regulations require identification of an environmentally preferable
16 alternative, and the CEQA Guidelines require identification of an
17 environmentally superior alternative. However, the CEQ Guidelines and CEQA
18 Guidelines do not require adoption of the environmentally preferable/superior
19 alternative as the preferred alternative for implementation. The Final EIS will
20 identify a preferred alternative. The selection of the preferred alternative is
21 independent of the identification of the environmentally preferable/superior
22 alternative, although the identification of both will be based on the information
23 presented in this EIS.

24 Section 1505.2(b) of the CEQ Regulations requires the NEPA lead agency to
25 identify the environmentally preferable alternative in a Record of Decision. The
26 CEQ Regulations define the environmentally preferable alternative as "...the
27 alternative that will promote the national environmental policy as expressed in
28 NEPA's Section 101. Ordinarily, this means the alternative that causes the least
29 damage to the biological and physical environment; it also means the alternative
30 which best protects, preserves, and enhances historic, cultural, and natural
31 resources". Similar to the environmentally preferable alternative under NEPA,
32 the CEQA Guidelines, Sections 15120 and 15126.6(e)(2), require identification
33 of an environmentally superior alternative. If the environmentally superior
34 alternative is the "no project" alternative, the CEQA Guidelines, Section
35 15126.6(e)(2), require identification of 1 an environmentally superior alternative
36 among the action alternatives.

37 Each action alternative generally has similar characteristics as all alternatives
38 vary based on combinations of dam raise height, water management, and
39 environmental restoration, and gravel augmentation. The primary distinguishing
40 factors between action alternatives are related to dam raise height, water supply
41 reliability, anadromous fish survival, and other project objectives. CP1, CP2,

1 and CP3 primarily address water supply reliability and anadromous fish
2 survival; however, each of these plans also would contribute to other project
3 objectives. Furthermore, the likelihood that each of these three plans would
4 meet its intended objectives is very high because the plans generally would not
5 rely on any other actions. However, CP4 would emphasize anadromous fish
6 survival through an increase in the Shasta Lake storage dedicated to cold-water
7 supply each year, Sacramento River environmental restoration, and gravel
8 augmentation, and CP5 specifically addresses reservoir area environmental
9 restoration and gravel augmentation. For Sacramento River and reservoir area
10 environmental restoration, success would depend on the continued effectiveness
11 of the environmental restoration facilities/features proposed as part of the
12 SLWRI – enhanced lake area spawning and rearing habitat, increased native
13 vegetation, and new riparian rehabilitation areas – well past completion of
14 construction.

15 Impacts associated with each alternative are summarized at the end of each
16 resource chapter and in Table S-1 in the Summary.

17 **26.5.1 Least Environmentally Damaging Practicable Alternative**

18 The SLWRI would require discharge of dredged or fill material into waters of
19 the United States. Section 404 of the Clean Water Act (CWA) authorizes
20 USACE to issue permits for the discharge of dredged or fill material into waters
21 of the United States, including wetlands (33 U.S. Code [USC] 1344).
22 Guidelines promulgated by the U.S. Environmental Protection Agency and
23 commonly known as the Section 404(b)(1) Guidelines (40 CFR 230 et seq.),
24 regulatory guidelines of USACE (33 CFR 320 et seq.), and NEPA guidelines
25 (40 CFR 1500 et seq.) are substantive environmental criteria used to evaluate
26 permit applications submitted to USACE. An analysis of practicable alternatives
27 is the primary screening mechanism used by USACE to determine the
28 appropriateness of permitting a discharge. A key element of this approval is the
29 requirement that USACE approve only the Least Environmentally Damaging
30 Practicable Alternative (LEDPA), in accordance with guidance provided by
31 Section 404(b)(1) of the CWA.

32 An alternative is considered practicable if it is available and capable of being
33 implemented after considering cost, existing technology, and logistics in light of
34 overall project purposes (40 CFR 230.3[q]). Practicable alternatives may
35 include placing a project in an area not owned by the applicant that could be
36 reasonably obtained by the project applicant to achieve the overall purpose of
37 the project (40 CFR 230.10[a][2]).

38 The LEDPA would be determined on the basis of the entire environmental
39 review and identified in the Record of Decision, consistent with Section
40 404(b)(1) of the Federal CWA, which requires that only the Least
41 Environmentally Damaging Practicable Alternative may be approved and
42 implemented by a Federal agency. This EIS provides a substantive portion of

1 the environmental information necessary for USACE to determine the LEDPA
2 consistent with Section 404(b)(1) guidelines.

3 **26.5.2 Environmentally Preferable Alternative/Environmentally Superior** 4 **Alternative**

5 CEQ Regulations require identification of an environmentally preferable
6 alternative, and the CEQA Guidelines require identification of an
7 environmentally superior alternative as discussed above.

8 Construction-related impacts would be similar for all of the action alternatives,
9 and the significance determinations for each of the action alternatives generally
10 are the same. Varying magnitudes of impacts generally would be related to the
11 height of the dam raise because additional construction resources would be
12 required for the larger raise and more land would be affected within the larger
13 inundation area. All of the action alternatives would provide additional
14 opportunities for flood risk reduction and increased anadromous fish survival;
15 they also would provide greater water supply reliability during extremely dry
16 years, which would benefit all water users. CP1 and CP2 would have less of an
17 impact on land uses within the reservoir area than the other action alternatives
18 because they would raise the dam by 6.5 feet and 12.5 feet, respectively,
19 compared to the 18.5-foot increase proposed under CP3, CP4, and CP5.
20 However, water supply reliability and anadromous fish survival would be
21 maximized with the larger raise.

22 This EIS provides a substantive portion of the environmental information
23 necessary for Reclamation to determine the Environmentally Preferable
24 Alternative. However, the public and other agencies reviewing a Draft EIS can
25 assist the lead agency to develop and determine environmentally preferable
26 alternatives by providing their views in comments on the Draft EIS.
27 Accordingly, and consistent with NEPA requirements, the environmentally
28 preferable alternative will be identified in the in the Final EIS and Record of
29 Decision.

30 **26.6 Compliance with Applicable Laws, Policies, and Plans**

31 For more detailed descriptions of the laws, policies, and plans listed below, see
32 Section 3.4, “Regulatory Framework.”

33 **26.6.1 Federal Requirements**

34 ***National Environmental Policy Act***

35 NEPA requires that an appropriate document be prepared to ensure that Federal
36 agencies accomplish the Act’s purposes. The Council on Environmental Quality
37 has adopted regulations and other guidance that provide detailed procedures for
38 Federal agencies to follow in implementing NEPA. Once finalized, Reclamation

1 would use the Final EIS to comply with Council on Environmental Quality
2 regulations and document NEPA compliance.

3 ***Clean Water Act***

4 **Section 404** A Section 404(b)(1) alternatives information package will be
5 prepared for the action alternatives and submitted to USACE and the U.S.
6 Environmental Protection Agency. In addition, Reclamation will obtain a
7 Section 404 permit before filling any waters of the United States. USACE will
8 issue a Record of Decision that addresses pertinent consideration and
9 implementation requirements. Section 404 also requires that the Least
10 Environmentally Damaging Practicable Alternative be identified and
11 implemented by an authorized Federal agency.

12 **Section 401** Water quality certification requires evaluation of potential
13 impacts in light of water quality standards and CWA Section 404 criteria
14 governing discharge of dredged and fill materials into waters of the United
15 States. The Federal government delegates water pollution control authority
16 under Section 401 of the CWA to the states. Refer to the Porter-Cologne Water
17 Quality Control Act discussion below.

18 ***Rivers and Harbors Act***

19 In USACE's Sacramento District, navigable waters of the United States in the
20 project area that are subject to the requirements of the Rivers and Harbors Act
21 include the Sacramento River and all waterways in the Sacramento–San Joaquin
22 drainage basin affected by tidal action. Sections of the River and Harbors Act
23 applicable to the action alternatives are described below.

24 **Section 9** All of the action alternatives include construction of dikes. A
25 Section 9 approval would be required before construction of any dikes.
26 Reclamation would obtain approval from the Chief of Engineers and the
27 Secretary of the Army before construction of any dikes in navigable waters of
28 the United States.

29 **Section 10** A Section 10 permit would be required before any activity that
30 would alter waters of the United States. To comply with the Rivers and Harbors
31 Act, Reclamation would apply for a permit from USACE's Sacramento District
32 before construction, and that application would be processed simultaneously
33 with the CWA Section 404 permit application. This DEIS evaluates the
34 environmental effects that the action alternatives would have on waters of the
35 United States, including navigable waters.

36 **Section 13** The Central Valley Regional Water Quality Control Board has
37 jurisdiction within the primary study area. The Federal government delegates
38 water pollution control authority to states under Section 402 of the CWA. Refer
39 to the Porter-Cologne Water Quality Control Act discussion below.

1 **Federal Endangered Species Act**

2 Reclamation has coordinated with USFWS and NMFS regarding potential
3 project effects on Federally listed species. The potential effects of the SLWRI
4 on endangered and threatened species are described in Chapter 11, “Fisheries
5 and Aquatic Ecosystems”; Chapter 12, “Botanical Resources and Wetlands”;
6 and Chapter 13, “Wildlife Resources.” Reclamation will prepare the appropriate
7 biological assessments to address potential impacts on Federally listed species
8 and will consult with USFWS and NMFS regarding impacts of the proposed
9 action.

10 **Magnuson-Stevens Fishery Conservation and Management Act**

11 Chapter 11, “Fisheries and Aquatic Ecosystems,” discusses impacts on fisheries
12 and fisheries habitat. Reclamation will coordinate with NMFS to ensure that
13 recommended measures be put into the Preferred Plan that would minimize
14 adverse modifications to Essential Fish Habitat. The specific implementation
15 plan will analyze the significance of modifications to Essential Fish Habitat and
16 will support the habitat assessments included for restoration-specific actions
17 during Endangered Species Act, Section 7 consultations.

18 **Fish and Wildlife Coordination Act**

19 Compliance with the Fish and Wildlife Coordination Act (FWCA) involves
20 assessing the impacts of the proposed action on preservation, conservation, and
21 enhancement of fish and wildlife habitat and preparation of a FWCA Report.
22 Reclamation will be required to include recommendations for preserving
23 affected habitats, mitigating their loss, and enhancing such habitats, in its
24 documentation of compliance. Documentation of compliance with the FWCA is
25 a separate analysis of habitats of concern to USFWS, NMFS, and CDFW, and
26 does not replace the analysis required by Section 7 of the Federal Endangered
27 Species Act.

28 **Migratory Bird Treaty Act**

29 Chapter 13, “Wildlife Resources,” evaluates potential impacts on migratory bird
30 species and identifies mitigation measures to reduce impacts on birds, nests, and
31 eggs. In addition, Reclamation will implement all feasible measures included in
32 the FWCA Report discussed above. Reclamation will comply with the
33 Migratory Bird Treaty Act by implementing mitigation measures described in
34 the DEIS and in the FWCA Report, before and during implementation of the
35 proposed action.

36 **Bald and Golden Eagle Protection Act**

37 USFWS has proposed new permit regulations to authorize the take of bald and
38 golden eagles under the Bald and Golden Eagle Protection Act, generally when
39 the take to be authorized is associated with otherwise lawful activities (72
40 Federal Register 31141–31155, June 5, 2007). With delisting of the bald eagle
41 in 2007, the Bald and Golden Eagle Protection Act is the primary law that
42 protects bald eagles as well as golden eagles. As discussed in Chapter 13,
43 “Wildlife Resources,” suitable habitat is not present for golden eagle in the

1 primary study area; however, each of the action alternatives would have a
2 significant and unavoidable impact on the bald eagle. Therefore, Reclamation
3 will consult with USFWS to implement the reasonable and prudent alternative
4 and conservation measures to reduce impacts on the bald eagle.

5 ***Safe Drinking Water Act***

6 Water used for domestic purposes must be treated in accordance with Federal
7 and State standards by the local or regional water supply. Reclamation will be in
8 compliance with the Safe Drinking Water Act because the action alternatives
9 would not change existing license requirements or impede enforcement of
10 primary drinking water standards.

11 ***Farmland Protection Policy Act***

12 As a Federal agency preparing environmental compliance documents,
13 Reclamation has included in its analysis a farmland assessment designed to
14 minimize adverse impacts on Prime and Unique Farmlands and provide for
15 mitigation as appropriate. Chapter 10, "Agriculture and Important Farmland,"
16 evaluates potential effects of the action alternatives on Important Farmland.

17 ***National Forest Management Act***

18 As discussed in Chapter 1, "Introduction," USFS is a cooperating agency in this
19 DEIS. Under the National Forest Management Act, any decision emanating
20 from a NEPA process must comply with the Land and Resource Management
21 Plan (LRMP) to authorize an action on lands managed by Shasta-Trinity
22 National Forest (STNF). Significant impacts on lands and resources managed
23 by STNF are discussed in Chapter 4, "Geology, Geomorphology, Minerals, and
24 Soils"; Chapter 12, "Botanical Resources and Wetlands"; Chapter 13, "Wildlife
25 Resources"; Chapter 17, "Land Use and Planning"; Chapter 18, "Recreation and
26 Public Access"; and Chapter 19, "Aesthetics and Visual Resources." These
27 impacts may require nonsignificant, project-specific amendments to the LRMP.

28 The National Forest Management Act also requires that USFS maintain viable
29 populations of existing native and desired nonnative species in the planning
30 area. Reclamation will meet this requirement by preparing a biological
31 evaluation and associated management indicator species assessment. Those
32 documents will be used by USFS to make a finding that the actions disclosed in
33 the record of decision, issued by Reclamation, will be consistent with the
34 LRMP.

35 ***Federal Land Policy and Management Act***

36 As described in Chapter 3, "Considerations for Describing the Affected
37 Environment and Environmental Consequences," the Federal Land Policy
38 Management Act directs USFS and BLM to manage public lands under the
39 principles of multiple use and sustained yield. Under the Federal Land Policy and
40 Management Act, the use and occupancy of public lands requires authorization
41 by a land management agency, typically under the auspices of a special-use
42 permit. As the principal land management agency for the Shasta Unit of the

1 Whiskeytown-Shasta-Trinity National Recreation Area, USFS and, to a lesser
2 degree, BLM, will need to use the Final EIS to support issuance of
3 authorizations to various parties, pursuant to the Federal Land Policy and
4 Management Act.

5 ***Wild and Scenic Rivers Act***

6 Section 7 of the Federal Wild and Scenic Rivers Act requires STNF to manage
7 the outstandingly remarkable values of the McCloud River, consistent with the
8 objectives, standards, and guidelines of its LRMP. The evaluation in the LRMP
9 concluded that the lower McCloud River, from McCloud Dam downstream
10 about 22 miles to the river's transition to Shasta Lake at about 1,070 feet mean
11 sea level, provides outstanding cultural, fisheries, and geologic values, and its
12 corridor has been classified as a highly sensitive visual area by USFS (USFS
13 1995). Based on the outstandingly remarkable values, STNF determined that the
14 lower McCloud River meets the eligibility requirements for designation under
15 the Federal Wild and Scenic Rivers Act. Chapter 25, "Wild and Scenic River
16 Considerations for McCloud River," evaluates potential effects of the SLWRI
17 on the McCloud River.

18 ***Federal Water Project Recreation Act***

19 Compliance with the Federal Water Project Recreation Act is achieved by
20 documenting the consideration of recreation opportunities in USACE reports
21 and NEPA documents. Within this DEIS, Reclamation has taken into
22 consideration and addressed outdoor recreation and fish and wildlife
23 enhancement in the primary and extended study areas.

24 ***National Historic Preservation Act***

25 Under Section 106 of the National Historic Preservation Act, Federal agencies
26 must consider effects to eligible resources ("historic properties") from the
27 proposed undertaking, in consultation with the California State Historic
28 Preservation Officer (SHPO) and other parties. This includes affording the
29 Advisory Council a reasonable opportunity to comment on such undertakings.
30 For this project, consultation between Reclamation, USFS, any other applicable
31 Federal agencies, SHPO, and other consulting parties would include
32 consideration of possible options for avoiding, minimizing, or mitigating
33 adverse effects. If SHPO, Reclamation, USFS, other applicable Federal
34 agencies, and the Council (if participating) agree to measures to resolve adverse
35 effects to historic properties, these are formalized in a Memorandum of
36 Agreement (MOA). Other consulting parties may be invited to sign the MOA.
37 The Section 106 process (36 CFR Part 800.14) is completed once the terms of
38 the MOA have been met. Alternatively, the Federal agencies may elect to enter
39 into a programmatic agreement that would be developed as an alternative
40 procedure to implement the Section 106 process (36 CFR Part 800.14). In rare
41 cases, if consultation fails to result in agreement on resolving adverse effects,
42 consultation may be terminated pursuant to the process detailed in 36 CFR Part
43 800.7.

1 **Indian Trust Assets**

2 When adverse impacts on Indian Trust Assets (ITA) cannot be avoided,
3 appropriate mitigation or compensation will be provided. ITAs consist of lands
4 that have been deeded to tribes or on which tribes have a historical legal claim.
5 However, no such lands are within the primary study area. Thus, the SLWRI
6 would have no impact on ITAs. Because ITAs have been evaluated and the
7 SLWRI would have no impact on these resources, the SLWRI would comply
8 with ITAs.

9 **Executive Order 11988 (Flood Hazard Policy)**

10 As discussed in Chapter 6, “Hydrology, Hydraulics, and Water Management,”
11 all of the action alternatives would have an effect on floodplains in the primary
12 study area. However, none of the action alternatives would increase flood flows,
13 and feasible mitigation would be implemented to compensate for the impact of
14 altered flow on riparian and wetland communities.

15 **Executive Order 11990 (Protection of Wetlands)**

16 As discussed in Chapter 12, “Botanical Resources and Wetlands,” a wetland
17 delineation will be prepared for the Preferred Plan and a USACE Section 404
18 permit will be obtained before construction. Reclamation will identify the
19 location of sensitive habitats by conducting a wetland delineation, avoid and
20 minimize impacts to the extent feasible, and compensate for any losses.
21 However, implementation of any of the action alternatives would result in
22 significant and unavoidable impacts on wetlands.

23 **Executive Order 12898 (Environmental Justice Policy)**

24 As discussed in Chapter 24, “Environmental Justice,” the disturbance or loss of
25 resources associated with locations considered by Winnemem Wintu and Pit
26 River Madesi Band members to have religious and cultural significance would
27 result in a disproportionately high and adverse effect on Native American
28 populations in the vicinity of Shasta Lake. Therefore, the project would
29 contribute to disproportionate placement of environmental impacts on Native
30 American populations and would result in a cumulatively considerable
31 incremental contribution to a significant and unavoidable cumulative impact.
32 No feasible mitigation is available to reduce this high and adverse effect.
33 Compliance with Executive Order 12898 occurs through the identification of
34 this effect and acknowledgement of the lack of feasible mitigation measures
35 available to reduce it.

36 **Americans with Disabilities Act**

37 The Americans with Disabilities Act of 1990 is a comprehensive law
38 prohibiting discrimination against people with disabilities in employment
39 practices, use of public transportation, use of telecommunication facilities, and
40 use of public accommodations. Title II of the ADA applies to government
41 facilities and requires that reasonable modifications must be made to services
42 and programs so that they are readily accessible to and usable by people with
43 disabilities. If any alternative proposed under the SLWRI is approved and

1 authorized, Reclamation would make every reasonable effort to make any new
2 construction or improvement fully compliant with ADA requirements. If it is
3 found to be infeasible to make a new construction or improvement element fully
4 ADA compliant, Reclamation would obtain any required waivers or
5 modifications to the ADA standards.

6 ***Executive Order 13007 (Indian Sacred Sites) and Memorandum of April***
7 ***29, 1994***

8 EO 13007 defines a sacred site as "any specific, discrete, narrowly delineated
9 location on Federal land that is identified by an Indian tribe, or Indian individual
10 determined to be an appropriately authoritative representative of an Indian
11 religion, as sacred by virtue of its established religious significance to, or
12 ceremonial use by, an Indian religion; provided that the tribe or appropriately
13 authoritative representative of an Indian religion has informed the agency of the
14 existence of such a site."

15 Potential impacts of the action alternatives on Native American sacred sites are
16 addressed in Chapter 14, "Cultural Resources." Reclamation will continue to
17 coordinate with federally recognized tribes to address potential impacts on
18 sacred sites.

19 ***Executive Order 13112 (National Invasive Species Management Plan)***

20 A weed management plan is within the scope of the action alternatives and
21 would include methods for managing the spread of invasive plant species.
22 Because the details of the weed management plan have not been finalized at the
23 time of this writing, this DEIS identifies preparation and implementation of a
24 weed management plan as a mitigation measure. Developing and implementing
25 the weed management plan as a mitigation measure demonstrates compliance
26 with Executive Order 13112. Reclamation will demonstrate continued
27 compliance with this executive order by implementing the methods described in
28 the weed management plan.

29 ***Federal Clean Air Act***

30 As discussed in Chapter 5, "Air Quality and Climate," the SLWRI would not
31 result in long-term effects on air quality. Because the effects of the action
32 alternatives on air quality have been evaluated and mitigated to the extent
33 possible, any of the action alternatives would comply with the Federal Clean
34 Air Act.

35 ***Federal Transit Administration***

36 This DEIS evaluates potential groundborne-vibration impacts on sensitive
37 receptors, including the maximum sensitivity of 65 vibration decibels for
38 hospitals, high-technology manufacturing, and laboratory facilities. Some
39 construction activities associated with the action alternatives could result in
40 groundborne vibrations exceeding 65 vibration decibels. However, sensitive
41 receptors would need to be within 250 feet of the activities to be affected, and
42 no sensitive receptors would be within this distance. Reclamation has

1 demonstrated consistency with this policy by evaluating the construction
2 activities that would generate the maximum possible groundborne vibration at
3 the highest sensitive uses.

4 ***Federal Energy Regulatory Commission***

5 Changes to hydroelectric facilities on the Pit River, including instream flow
6 releases or modifications to downstream structures, may necessitate a license
7 amendment from the Federal Energy Regulatory Commission. Reclamation will
8 support Pacific Gas and Electric Company in any application to the Federal
9 Energy Regulatory Commission for necessary license amendments before
10 implementing any action alternatives that would affect Pit River flows.

11 ***U.S. Coast Guard***

12 The SLWRI has the potential to affect several bridges over inflows to Shasta
13 Lake. Reclamation will coordinate with the U.S. Coast Guard in respect to these
14 potential impacts.

15 **26.6.2 State Requirements**

16 ***California Environmental Quality Act***

17 This document has been prepared in accordance with CEQA and may be used
18 by State lead, responsible, and trustee agencies that would be involved in
19 project review and approval of certain aspects of the proposed project under
20 their jurisdiction.

21 ***California Endangered Species Act***

22 Evaluations have been conducted for State-listed endangered and threatened
23 species, and have determined that the proposed action would affect several
24 State-listed species. Effects on those species are discussed in Chapter 11,
25 “Fisheries and Aquatic Ecosystems”; Chapter 12, “Botanical Resources and
26 Wetlands”; and Chapter 13, “Wildlife Resources.” Reclamation will prepare
27 appropriate biological assessments to address potential impacts on Federally
28 listed species, and will consult with CDFW regarding impacts of the proposed
29 action on State-listed species.

30 ***California Fish and Game Code—Fully Protected Species***

31 This DEIS identifies potential actions that could result in take of fully protected
32 species, and Reclamation will work closely with CDFW to evaluate methods to
33 avoid impacts on fully protected species.

34 ***California Fish and Game Code Section 1602—Streambed Alteration***

35 A CDFW streambed alteration agreement must be obtained for any project that
36 would result in an impact on a river, stream, or lake. This DEIS identifies
37 potential actions within the proposed action that would require the alteration of
38 stream features, subject to Section 1602 of the California Fish and Game Code.
39 This document requires Reclamation to secure an approved streambed alteration
40 agreement before performing any actions subject to Section 1602.

1 **California Fish and Game Code Sections 5900–5904, 5930–5948, 7261,**
2 **and 7370—Fish Passage**

3 This DEIS identifies actions that could affect fish passage, and Reclamation will
4 work closely with CDFW to evaluate methods to avoid impacts on sturgeon,
5 fish passage, and designated “Heritage Trout Waters.” Potential impacts on
6 fisheries are described in Chapter 11, “Fisheries and Aquatic Ecosystems.”

7 **California Native Plant Protection Act**

8 All action alternatives are evaluated in this DEIS for consistency with this Act.
9 Mitigation measures are provided, as necessary, to minimize potential take of
10 listed and special-status plants under the California Native Plant Protection Act.

11 **California Native Plant Society Species Designations**

12 This DEIS identifies plants of concern on California Native Plant Society lists
13 that may be affected by the action alternatives, using these lists as a method of
14 identifying species of concern. Mitigation and minimization measures will be
15 implemented, as necessary, to reduce the significance of potential impacts on
16 these species of concern.

17 **Central Valley Flood Control Act of 2008**

18 Reclamation has developed the action alternatives in a manner that is consistent
19 with the Central Valley Flood Control Act, and the action alternatives would not
20 inhibit development and implementation of the *Central Valley Flood Protection*
21 *Plan*.

22 **Central Valley Flood Protection Board Encroachment Permit**

23 Certain action alternatives would require work along the Sacramento River in
24 areas that may be subject to Title 23; the river is managed for flood control, and
25 thus it contains features subject to Central Valley Flood Protection Board
26 jurisdiction. Reclamation will secure encroachment permits, as needed, to
27 satisfy Title 23 before performing any work along relevant reaches of the
28 Sacramento River that contain flood control features subject to Central Valley
29 Flood Protection Board jurisdiction.

30 **Water Rights**

31 The action alternatives do not include any actions that would require
32 acquisition, use, or modification of water rights. Therefore, the action
33 alternatives would comply with all existing water rights in the primary and
34 extended study areas.

35 **California Public Resources Code**

36 The Legislature has declared that the McCloud River, which is within the
37 primary study area, possesses “extraordinary resources” in the context of
38 Section 5093.542 of the California Public Resources Code, established through
39 enactment of the Wild and Scenic Rivers Act, as amended (Sections
40 5093.50 through 5093.70). However, the Legislature’s action stopped short of
41 formally designating the river as wild and scenic. Chapter 25, “Wild and Scenic

1 River Considerations for McCloud River,” evaluates potential effects of the
2 action alternatives on the McCloud River. New legislation may be required for
3 State support and/or participation in any of the action alternatives.

4 The California Public Resources Code also contains several other sections
5 relevant to the project. Compliance with provisions of the California Public
6 Resources Code is achieved in this DEIS by analyzing the impact of the action
7 alternatives on recreation opportunities. Chapter 18, “Recreation and Public
8 Access,” discusses effects on Shasta Lake and the surrounding recreation areas
9 under the action alternatives.

10 ***California Harbors and Navigation Code***

11 Significant modifications to facilities on Shasta Lake may necessitate
12 coordination with the California Department of Boating and Waterways and/or
13 the U.S. Coast Guard. Reclamation will coordinate with them as necessary.

14 ***Porter-Cologne Water Quality Control Act***

15 Action alternatives that have the potential to adversely affect water quality are
16 identified in this DEIS. Measures necessary for compliance with the Act would
17 need to achieve consistency with implementation programs under the water
18 quality control plan for the Sacramento River basin, and with the Central Valley
19 Regional Water Quality Control Board’s waste discharge requirements. Other
20 necessary actions likely would include application for and finalization of
21 National Pollutant Discharge Elimination System permits and Section 401 water
22 quality certifications.

23 ***California Land Conservation Act of 1965 (Williamson Act)***

24 Approximately 51 percent of Shasta County’s farmland is under Williamson
25 Act contracts (Shasta County 2004). Williamson Act lands affected by the
26 action alternatives are discussed in Chapter 10, “Agriculture and Important
27 Farmland.”

28 ***California Clean Air Act***

29 This DEIS evaluates the contribution of the action alternatives to any violation
30 of air quality standards and identifies mitigation measures to help achieve
31 consistency with the State implementation plan’s attainment goal before
32 implementation of any of the alternative actions.

33 ***California Scenic Highway Program***

34 On the south side of Shasta Lake, portions of State Route 151 are an officially
35 designated State Scenic Highway. County Road A18 is an officially designated
36 County Scenic Highway, and it also is located on the southern side of Shasta
37 Lake. Portions of Interstate 5, as it approaches Shasta Lake and crosses the Pit
38 River Bridge, are considered eligible for designation as a State Scenic Highway.
39 Impacts on scenic highways are discussed in Chapter 19, “Aesthetics and Visual
40 Resources.”

1 **State Lands Commission Land Use Lease**

2 In the primary study area, the lands under the jurisdiction of the California State
3 Lands Commission include areas along the Sacramento River, north of Red
4 Bluff. Work on the Sacramento River would require a lease from the California
5 State Lands Commission. Reclamation will coordinate with the California State
6 Lands Commission and obtain a State Lands Commission Land Use Lease
7 before starting work in areas under the Commission’s jurisdiction.

8 **California Surface Mining and Reclamation Act**

9 In general, the Surface Mining and Reclamation Act of 1975 (SMARA) requires
10 that the lead agency approve a permit and a reclamation plan, and that an
11 approved financial assurance be posted for the reclamation of the mined land. If
12 borrow is required from borrow site(s), not previously permitted under
13 SMARA, Reclamation will either obtain a SMARA permit or an exemption
14 from SMARA for all borrow sites before beginning borrow activities.

15 **State of California General Plan Guidelines**

16 Chapter 8, “Noise and Vibration,” evaluates long-term effects on noise levels in
17 the primary and extended study areas. Long-term changes in noise levels
18 associated with any of the alternative actions would be less than significant. All
19 alternative actions would comply with the appropriate noise guidelines based on
20 Reclamation’s evaluation of long-term compatibility of the actions with noise
21 levels.

22 **California Department of Transportation**

23 Highway improvements or modifications that may be necessary as part of this
24 project may require an encroachment permit, issued through the California
25 Department of Transportation (Caltrans). The project may involve
26 modifications to roadways that Caltrans considers “complex,” and Reclamation
27 would need extensive communication with the Caltrans Department of
28 Engineering Services and/or structure-specific encroachment permits. The
29 requirements are detailed in the *Caltrans Encroachment Permits Manual*, which
30 is available at the Caltrans Web site.

31 **26.6.3 Local Plans and Policies**

32 **Shasta County Air Quality Management District’s Authority to Construct**
33 **and Permit to Operate**

34 Reclamation would obtain an Authority to Construct permit before building or
35 installing any new emissions unit or modifying any existing emissions unit that
36 requires a permit, if necessary. Reclamation also would obtain a Permit to
37 Operate after all construction is completed and the emission unit is ready for
38 operation, if needed.

39 **Other Local Permits and Requirements**

40 Several other local permits and requirements may apply to the action
41 alternatives. Shasta and Tehama counties and their public works departments

1 will require compliance with local plans and ordinances, such as the county
2 general plan, zoning ordinances, grading plan, and various use permits. Utility
3 easements and various encroachments also may be required.

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Chapter 27

Public Involvement, Consultation, and Coordination

This chapter summarizes completed, ongoing, and anticipated public outreach and agency involvement efforts related to development of the SLWRI, including activities that satisfy NEPA requirements for public scoping and agency consultation and coordination. Efforts to engage the public, stakeholders, Federally recognized tribes, Native American tribal groups, and public agencies are an important role in the SLWRI. These efforts are guided by the *Strategic Agency and Public Involvement Plan* (Reclamation 2003a), and include a broad range of activities designed to accomplish official and supplementary outreach goals. Chapter 29, “DEIS Distribution List,” lists the entities receiving a copy of the DEIS. Reclamation encourages review of this DEIS and will continue to solicit public and agency input on the proposed action.

The *Strategic Agency and Public Involvement Plan* features four main objectives:

- **Stakeholder Identification** – Identifying and involving individuals, groups, and other entities that have an expressed or implied interest in the SLWRI.
- **Project Transparency** – Informing stakeholders and the public of study results in a timely, unbiased fashion through a variety of methods, including stakeholder and/or public meetings, Web postings, and mailings.
- **Issues and Concerns Resolution** – Gaining awareness of the issues and concerns of stakeholders and the public early in the process, and responding to these issues in an effective and timely manner.
- **Project Implementation** – Assisting policy-makers in understanding project purposes and benefits, and demonstrating that the project has met all necessary requirements to be implemented.

27.1 Public Involvement Through Project Scoping

Public scoping activities are conducted as part of compliance with both NEPA and CEQA, but are more formalized under NEPA. Scoping allows agencies, stakeholders, organizations, and other interested parties to identify resources to be evaluated, issues that may require environmental review, reasonable alternatives to consider, and potential mitigation if significant adverse effects are identified. The scoping process helps with early identification of problems to be studied, and also helps to eliminate from detailed study issues that are not critical to the decision at hand. Scoping also provides decision makers with insight on the issues and concerns that the public believes should be considered as part of the feasibility study. Public scoping activities performed for the SLWRI environmental documentation process are described below.

27.1.1 Notice of Intent to Propose an Environmental Impact Statement

Reclamation initiated the scoping process by publishing a notice of intent to prepare an EIS and a notice of public scoping meetings pursuant to NEPA on October 7, 2005, in the *Federal Register* (Volume 70, pages 58744–58746). The opportunity for submitting written comments on the notice of intent extended through December 6, 2005.

On the same day that the notice of intent and notice of meetings were published in the *Federal Register*, Reclamation announced the scoping meetings to be held in a news release posted on the project Web site and distributed via e-mail to media in the extended study area. The release was also distributed to agencies, stakeholders, organizations, and other interested parties. A second news release on October 20, 2005, announced an additional scoping meeting to be held in Red Bluff, and was published in display advertisements that Reclamation purchased in newspapers within the immediate study area in Redding, Red Bluff, and Dunsmuir.

27.1.2 Public Scoping Meetings

In 2005, seven public scoping meetings were conducted in an “open house” format throughout California to update the public on the status of the proposed action and to solicit and receive input on alternatives, project related concerns, and issues to be addressed in the environmental review process. Project team members from Reclamation and its consultants staffed informational workstations and interacted with meeting participants to provide information and answer questions. Attendance ranged from very light for meetings held in Concord, Fresno, and Los Angeles at 2, 2 and 4 people, respectively. Attendance was comparatively stronger in Dunsmuir, Redding, Red Bluff and Sacramento at 11, 39, 20 and 10 people, respectively. The proximity to the projects, and advertisements in three local newspapers, likely contributed to a stronger attendance in the northern cities.

The meetings were attended by private citizens, Federal and State agency personnel, local government representatives, political representatives, members

1 of the media, Native American tribes, Native American groups, and business
2 owners, and representatives of private industry, utilities, environmental interest
3 groups, and nongovernmental organizations.

4 Displays of information were presented at each meeting on large-scale panels at
5 a series of four workstations. Information included on these panels is
6 summarized as follows.

7 ***Background***

8 This workstation described Shasta Dam and Shasta Lake, authorization of the
9 Federal feasibility study and other pertinent guidance, the CALFED Bay-Delta
10 Program Record of Decision (ROD) relating to enlarging Shasta Dam and
11 Shasta Lake, and the primary and extended study areas.

12 ***Environmental Overview***

13 This workstation summarized the major resource areas to be evaluated, defined
14 the biological, socioeconomic, physical, and cultural environments, and
15 identified potential impacts on those environments. The workstation also
16 included information on the Federal environmental review process and Federal
17 and State regulatory requirements and processes.

18 ***Study Process***

19 This workstation presented information on water resources problems and needs
20 being addressed in the SLWRI environmental documents. The primary and
21 secondary study objectives were identified along with the overall study mission.
22 The workstation also included information about the Federal plan formulation
23 process, including the development of the SLWRI initial alternatives and the
24 formulation of comprehensive alternatives.

25 ***Initial Alternatives***

26 This workstation described the initial alternatives formulated, potential major
27 features associated with potential enlargement of Shasta Dam and Shasta Lake
28 that are likely to be considered in future studies, and potential environmental
29 restoration features to be included in the alternatives.

30 The *Environmental Scoping Report* (Reclamation 2006) describes the scoping
31 process, comments received during scoping, and how these comments would be
32 addressed as part of the SLWRI and in support documentation (e.g. Feasibility
33 Report and EIS).

34 **27.2 PDEIS Outreach**

35 In advance of this DEIS, Reclamation released the Preliminary Draft
36 Environmental Impact Statement and the Draft Feasibility Report. This
37 February 2012 release was followed by an October 2012 Reclamation news
38 release requesting additional public comment on the Draft Feasibility Report for

1 input on potential cost, benefits and impacts of enlarging Shasta Dam and
2 Reservoir. In December 2012, Reclamation extended the comment period for
3 review of the document from December 28, to January 28, 2013, to allow time
4 for additional public comments on the Draft Feasibility Report.

5 **27.3 Other Public Outreach**

6 In addition to scoping activities, other public outreach activities have included
7 the following:

- 8 • Release of major previous Reclamation studies and reports
9 investigating potential enlargement of Shasta Dam and Reservoir
10 included: *Enlarged Shasta Lake Investigation Preliminary Findings*
11 *Report* (1983), *Shasta Dam and Reservoir Enlargement, Appraisal*
12 *Assessment of the Potential for Enlarging Shasta Dam and Reservoir*
13 *(1999)*, *SLWRI Strategic Agency and Public Involvement Plan* (2003b),
14 *SLWRI Mission Statement Milestone Report* (2003a), *SLWRI Initial*
15 *Alternatives Information Report* (2004a), *SLWRI Environmental*
16 *Scoping Report* (2006), and *SLWRI Plan Formulation Report* (2007).
17 As described above, Reclamation also completed the Preliminary DEIS
18 (2011a), Draft Feasibility Report (2011b), and supporting technical
19 appendices for the SLWRI in November 2011. These documents were
20 released to the public in February 2012, to share study findings and
21 provide additional opportunities for public and stakeholder input.
- 22 • Release of two project information papers associated with milestone
23 reports- the *Mission Statement Milestone Report* (Reclamation 2003b)
24 and the *Initial Alternatives Information Report* (Reclamation 2004a) –
25 in support of public outreach.
- 26 • Stakeholder workshops during development of the SLWRI (multiple
27 years)
- 28 • Project briefings to Federal, state and local elected officials, water and
29 hydropower interest groups, and environmental interest groups in 2003.
- 30 • Project update meetings with property owners and/or business interests
31 in the Shasta Lake area (multiple years)
- 32 • Presentations to the California Water Commission, Bay-Delta Public
33 Advisory Committee, and related agency presentations (multiple years)
- 34 • Briefings to resource management groups and stakeholders (multiple
35 years)
- 36 • Project Web site for the SLWRI (www.usbr.gov/mp/slwri/index.html)

1 Future meetings will focus primarily on public outreach related to the release of
2 this DEIS.

3 **27.4 Consultation and Coordination**

4 Reclamation has consulted various public agencies and organizations during the
5 public outreach process and throughout development of the SLWRI DEIS to
6 obtain feedback on the investigation. Consultations have assisted Reclamation
7 in determining the scope of the DEIS, developing project components and
8 objectives, identifying the range of alternatives, and defining potential
9 environmental impacts, impact significance, and mitigation measures.

10 **27.4.1 Consultation and Coordination with Agencies**

11 Reclamation conducts ongoing consultation and coordination efforts with
12 agencies. The SLWRI study management structure includes the active
13 participation of numerous cooperating agencies and other stakeholders on a
14 Project Coordination Team (PCT) and Study Management Team and in
15 Technical Working Groups. Cooperating agencies for the SLWRI, pursuant to
16 NEPA, include USFS, Colusa Indian Community Council of the Cachil Dehe
17 Band of Wintun Indians, USACE, and U.S. Department of the Interior, Bureau
18 of Indian Affairs. Other participants in the PCT include USFWS, NMFS, U.S.
19 Department of the Interior, Bureau of Land Management, DWR, CDFW, and
20 other Federal and State agencies. These groups were active contributors to the
21 ongoing development and/or review of the alternative plans that are addressed
22 herein and in supporting documentation.

23 The PCT is among the most effective means of communication between
24 agencies, continuing to provide for regular participation by numerous
25 cooperating agencies. Regularly scheduled bimonthly meetings have been held
26 and continue to be held, for the purpose of project coordination and decision
27 making, with invitations extended to all cooperating agencies and other
28 CALFED Bay-Delta Program agencies and the Central Valley Regional Water
29 Quality Control Board.

30 Key elements of these coordination activities are the *Planning Aid*
31 *Memorandum* and *Coordination Act Report*, documents issued by USFWS. A
32 draft *Planning Aid Memorandum* outlining areas of potential concern was
33 circulated among the resource agencies in the first quarter of 2007.
34 Development of the *Coordination Act Report* began in summer 2007, with
35 circulation of a draft in 2008.

36 **27.4.2 Consultation and Coordination with Tribal Governments**

37 Consistent with a memorandum from the President on April 29, 1994,
38 Reclamation and the cooperating agencies will continue to actively engage
39 Federally recognized tribal governments in planning and developing the
40 investigation, and will consult with each tribe on a government-to-government

1 basis before taking actions that could affect such tribal governments. Under
2 Federal Trust responsibility, Reclamation will provide full disclosure (benefits
3 and negative impacts) of the project, allow time for tribal review/consultation,
4 and receive comments and/or suggestions for alternatives.

5 The PCT held several coordination meetings with Federally recognized tribes
6 during 2007 and 2008. Tribes were invited to an informal meeting held on April
7 4, 2007, in Redding, California, to provide general information about the
8 SLWRI and determine tribal participation interests. Additionally, from August
9 2007 to November 2008, members of the PCT held six separate meetings with
10 four Federally recognized tribes whose traditional territories overlap with the
11 SLWRI project area. The purposes of the meetings were to solicit, clarify, and
12 document major concerns and issues regarding the SLWRI, and to establish a
13 preferred method or approach for maintaining effective communication with
14 each tribe during the remainder of the feasibility study and in future endeavors.

15 **27.4.3 Coordination with Native American Tribal Groups**

16 In accordance with Executive Order 12898, Native Americans – including
17 Federally-recognized and non-Federally recognized tribes – are considered
18 minority populations, and are encouraged as stakeholder groups to participate in
19 the ongoing investigation. Several groups, such as the Winnemem Wintu and
20 Shasta Nation, have expressed significant interest in the SLWRI. In response,
21 the PCT conducted 10 meetings and dialogues in 2007 and 2008 with Native
22 American groups whose traditional homelands overlap with the SLWRI study
23 area; four of these meetings engaged non-Federally recognized Native
24 American groups. Groups were invited to an April 4, 2007, informal meeting to
25 receive general information about the SLWRI and to identify their interests for
26 project participation. As with Federally recognized tribes, meetings were held
27 with Native American groups to solicit, clarify, and document major concerns
28 and issues regarding the SLWRI, and to establish each group's preferred
29 method or approach for receiving communications about the SLWRI during the
30 remainder of the study.

31 **27.5 Major Topics of Interest**

32 The focus of interest varied among the outreach activities, but a common theme
33 centered on potential impacts on the Shasta Lake area that could result from
34 enlargement of the reservoir.

35 The public, stakeholders, and other Federal agencies, and State and local
36 agencies identified several areas of concern during SLWRI meetings and
37 workshops. Key topics included potential adverse effects on cultural resources
38 in the Shasta Lake area; recreation and recreation providers in the
39 Whiskeytown-Shasta-Trinity National Recreation Area; terrestrial special-status
40 species around Shasta Lake, including State-designated fully protected species,
41 aquatic special-status species in the Sacramento River and Sacramento-San

1 Joaquin Delta (including delta smelt); the lower McCloud River and its special
2 designation under California Public Resources Code 5093.542(c); Delta water
3 quality; south Delta water levels; Central Valley hydrology below CVP and
4 SWP facilities and resulting effects on water supplies for water contractors and
5 other water users; and consistency with the CALFED Bay-Delta Program ROD.
6 These topics are described in more detail in Section 1.6, “Areas of
7 Controversy/Issues to Be Resolved.”

8 **27.6 Next Steps in the Environmental Review Process**

9 This DEIS will be circulated for public and agency review and comment for 90
10 days following the date when the U.S. Environmental Protection Agency
11 publishes the notice of availability of weekly receipt of environmental impact
12 statements in the *Federal Register*. During this public comment period,
13 Reclamation intends to hold public meetings/hearings in Los Banos, Redding
14 and Sacramento to solicit and receive public input on the DEIS. These meetings
15 will be formatted similar to public scoping with an open house preceding a
16 formal public hearing. The open house will include project information stations
17 staffed by project team member available to respond to attendee’s questions.
18 The open house will conclude with a presentation. At the conclusion of the open
19 house, a public hearing will be initiated consistent with NEPA guidelines.
20 Comments provided during the public hearing will be addressed in the Final
21 EIS. In addition, written comments from the public, reviewing agencies, and
22 stakeholders will be accepted during the public comment period.

23 A Final EIS will be prepared and circulated in accordance with NEPA
24 requirements and will include responses to all comments. When the Final EIS is
25 complete, Reclamation will publish the document, and the notice of availability
26 will be printed in the *Federal Register*, which will mark the start of a minimum
27 30-day waiting period before Reclamation issues its ROD on the investigation.
28 The date of the release of the Final EIS has not been determined. In the ROD,
29 which is the final step in the NEPA process, Reclamation will document its
30 decision on which actions, if any, to take to address the primary objectives. It
31 will also describe other risk reduction plans it considered, identify any
32 mitigation plans, and describe factors and comments taken into consideration
33 when making its decision.

34 To date, CEQA scoping has not been initiated. This process will commence
35 after a State lead agency is identified.

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1 Chapter 28

2 DEIS Distribution List

3 This chapter provides locations where this DEIS is available for review and
4 provides an overview the governmental entities, organizations, and interested
5 parties that received copies of this DEIS. This list includes agencies and
6 organizations that were involved in the scoping process for the proposed action,
7 requested a copy of the DEIS, or that may use the DEIS for discretionary or
8 informational purposes.

9 28.1 Document Availability

10 The public distribution of this DEIS emphasizes the use of electronic media to
11 ensure cost-effective, broad availability to the public and interested parties. This
12 DEIS is available on the Internet at Reclamation’s Web site,
13 <<http://www.usbr.gov/mp/slwri/documents.html>>. The DEIS is also available
14 for review at the following locations:

15 U.S. Department of the Interior, Bureau of Reclamation Library
16 2800 Cottage Way
17 Sacramento, CA 95825

18 Bureau of Reclamation, Northern California Area Office
19 16349 Shasta Dam Boulevard
20 Shasta Lake, CA 96019

21 U.S. Department of the Interior, Natural Resources Library
22 1849 C Street NW, Main Interior Building
23 Washington, D.C., 20240

24 Dunsmuir Branch Library
25 5714 Dunsmuir Avenue
26 Dunsmuir, CA 96025

27 Shasta County Public Library,
28 Redding Library
29 1100 Parkview Avenue
30 Redding, CA 96001

31 Kern County Library,
32 Holloway-Gonzales Branch

1 506 East Brundage Lane
2 Bakersfield, CA 93307

3 Concord Library
4 2900 Salvio Street
5 Concord, CA 94519

6 Los Banos Public Library
7 1312 South 7th Street
8 Los Banos, CA 93635

9 Napa City-County Library
10 580 Coombs St.
11 Napa, California 94559

12 **28.2 Agencies and Organizations Receiving Copies of the DEIS**

13 All persons, agencies, and organizations listed in this chapter have been
14 informed of the availability of and locations to obtain the DEIS. Parties listed
15 below have received an electronic or hard copy of the main body of this DEIS
16 or the entire DEIS, including appendices.

17 **28.2.1 Federal Agencies**

- 18 • U.S. Army Corps of Engineers
- 19 • U.S. Department of Interior, Fish and Wildlife Service
- 20 • U.S. Department of Interior, Bureau of Indian Affairs
- 21 • U.S. Department of Interior, Bureau of Land Management
- 22 • U.S. Department of Agriculture, Forest Service
- 23 • U.S. Department of Commerce, National Marine Fisheries Service
- 24 • U.S. Environmental Protection Agency

25 **28.2.2 State Agencies**

- 26 • California Water Commission
- 27 • California Department of Boating and Waterways
- 28 • California Department of Conservation
- 29 • California Department of Education
- 30 • California Department of Fish and Wildlife

- 1 • California Department of Public Health
- 2 • California Department of Parks and Recreation
- 3 • California Department of Toxic Substances Control
- 4 • California Department of Transportation
- 5 • California Department of Water Resources
- 6 • California Department of Food and Agriculture
- 7 • California Department of Forestry and Fire Protection
- 8 • California Environmental Protection Agency
- 9 • California Highway Patrol
- 10 • California Air Resources Board
- 11 • California Central Valley Flood Protection Board
- 12 • Central Valley Regional Water Quality Control Board
- 13 • California Governor's Office of Planning and Research
- 14 • State Water Resources Control Board
- 15 • California Energy Commission
- 16 • Delta Protection Commission
- 17 • Delta Stewardship Council
- 18 • Native American Heritage Commission
- 19 • State Lands Commission
- 20 • Office of Historic Preservation

21 **28.2.3 Regional and Local Entities**

- 22 • Shasta County
- 23 • Tehama County
- 24 • Siskiyou County
- 25 • Trinity County

- 1 • Shasta County Air Quality Management District
- 2 • Tehama County Air Quality Management District
- 3 • City of Anderson
- 4 • City of Corning
- 5 • City of Dunsmuir
- 6 • City of Mount Shasta
- 7 • City of Redding
- 8 • City of Red Bluff
- 9 • City of Shasta Lake

10 **28.2.4 Tribal Interests**

- 11 • Grindstone Indian Rancheria
- 12 • Paskenta Band of Nomlaki Indians
- 13 • Pit River Environmental Council
- 14 • Pit River Tribe of California
- 15 • Redding Rancheria
- 16 • Shasta Nation
- 17 • United Tribe of Northern California, Inc.
- 18 • Winnemem Wintu Tribe
- 19 • Wintu Educational and Cultural Council
- 20 • Wintu Tribe of Northern California
- 21 • Lone Pine Paiute-Shoshone Tribe
- 22 • Cortina Indian Rancheria
- 23 • Wintu Tribe of Northern California
- 24 • Cantara Indian Rancheria
- 25 • Montgomery Creek (Pit River)

- 1 • Roaring Creek Tribe
- 2 • The United Tribe of Northern California, Inc.
- 3 • Robinson Rancheria, Band of Pomo Indians

4 **28.2.5 Other Interested Parties**

- 5 • Over 250 non-governmental organizations representing environmental,
6 agricultural, business and related interests
- 7 • Over 50 water districts, irrigation districts, other water purveyors, and
8 related utilities
- 9 • Over 50 media outlets
- 10 • Over 180 private business interests
- 11 • Over 1,000 individuals, including reservoir area property owners

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Chapter 29

List of EIS Preparers

Following is a list of persons who contributed to preparation of this DEIS.

This list is consistent with the requirements set forth in NEPA and CEQA (40 CFR 1502.17 and Section 15129 of the State CEQA Guidelines).

29.1 Federal

Reclamation (NEPA Lead Agency)	
Ron Ganzfried	Senior Reviewer
Katrina Chow	Project Manager
Carolyn Bragg	Environmental Resources
Jared Vauk	Geology
Greg Mangano	Geology
Russ Yaworsky	Water Operations
Tom Fitzhugh	Water Operations
Steve Lloyd	Engineering
Tom Hepler	Engineering
Bill Taylor	Engineering
Bob Gee	Planning
Craig Stroh	Economics
Julie Bowen	Real Estate
Chuck Johnson	Recreation
Scott Springer	Recreation
John Hannon	Fisheries Biologist
Patricia Rivera	Indian Trust Assets
Anastasia Leigh	Cultural Resources
Laureen Perry	Cultural Resources
Louis Moore	Public Affairs
Michael Tansey	Climate Change
David Hansen	GIS

29.2 Non-Federal

29.2.1 Consultants

Name	Qualifications	Participation
MWH		
Mary Paasch, P.E.	B.S., Agricultural Engineering; M.S., Agricultural Engineering; 17 years of experience.	Project Manager
Danelle Bertrand	B.S., Civil Engineering; M.S., Civil Engineering; 6 years of experience.	Project Planner
Vanessa Welsh	B.S., Watershed Science; M.A. Environmental Law and Policy; 8 years of experience.	Project Planner and Document Coordination
Jill Chomycia, P.H.	B.S., Geological Sciences; M.S., Soil Sciences; M.S., Hydrology; 9 years of experience.	Project Planner
William Smith, P.E.	B.S., Forest Engineering; 36 years of experience.	Water Quality, Water Management and Power and Energy
Ian Buck	B.S., Civil Engineering; 3 years of experience.	Engineering, Recreation, Real Estate and Cost Estimating
Andy Draper, P.E.	B.S., General Engineering; M.S., Irrigation Engineering; Ph.D., Water Resources; 34 years of experience.	Water Quality; Hydrology, Hydraulics, and Water Management
Stephanie Theis	B.S., Fisheries Ecology; Graduate Studies, Applied Ecology and Conservation Biology; 23 years of experience.	Fisheries and Aquatic Ecosystems
Vincent Barbara	B.S., Agriculture/Business Policy; M.A., Economics; 5 years of experience.	Economics
Erica Bishop	B.S., Geography; M.S., Water Resources/ Geography; 9 years of experience.	Geology, Geomorphology, Minerals and Soils
Rajaa Hassan, P.E.	B.S., Civil Engineering; M.S., Civil and Environmental Engineering; 12 years of experience.	Power and Energy
Heather Shannon	B.S., Geology; M.S., Hydrology; 9 years of experience.	Geology, Geomorphology, Minerals, and Soils

Name	Qualifications	Participation
MWH (contd.)		
Craig Altare, P.G.	B.S., Geological Sciences; M.S., Hydrology; 9 years of experience.	Geology and Water Quality
Barbara McDonnell	B.A., Biology; M.A., Biology; 37 years of experience.	NEPA/CEQA Specialist
Meredith Parkin	B.S., Human Nutrition and Food Science; 13 years of experience.	NEPA/CEQA Specialist
Eric Clyde, P.E.	B.S., Civil Engineering; M.S., Civil Engineering; 35 years of experience.	Engineering; Hydrology, Hydraulics, and Water Management.
Shankar Parvathinathan	B.E., Chemical Engineering; M.S., Environmental Engineering; Ph.D., Environmental Engineering; 12 years of experience.	Engineering and Hydraulics
Jeff Payne, P.E.	B.S., Civil Engineering; M.S., Water Resources Engineering; 14 years of experience.	Climate Change
David Altare, P.E.	B.S., Biology; B.S., Civil Engineering; 8 years of experience.	Hydrology and Hydraulics, Fisheries and Aquatic Ecosystems
Robert Filgas, P.E.	B.S., Civil Engineering; 27 years of experience.	Engineering
Philip Salzman, P.E.	B.S. Civil Engineering; B.A. Biological Sciences; 17 years of experience.	Engineering
Matthew Carpenter, P.E.	B.S., Civil Engineering; 14 years of experience.	Engineering
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Andrew Nishihara	B.S., Bioengineering; 4 years of experience.	Engineering
James Loucks, P.E.	B.S., Construction Engineering; 32 years of experience.	Cost Estimating
Don Crone, P.E.	B.S., Civil Engineering; 38 years of experience.	Cost Estimating
Paul Smith	B.S., Civil Engineering; 46 years of experience.	Cost Estimating

Shasta Lake Water Resources Investigation
Environmental Impact Report

Name	Qualifications	Participation
MWH (contd.)		
Elmer Cabero, P.E.	B.S., Civil Engineering; M.A., Business Administration; 32 years of experience.	Cost Estimating
Puja Mohandas	B.A., Architecture; M.A., Architecture; M.S., Civil Engineering; 9 years of experience.	Cost Estimating
Craig Moyle	B.A., Journalism; 20 years of experience.	Public Involvement
Maricela Leyva	12 years of experience.	Administrative Assistant
Emily McAlister	B.A., Liberal Studies; 32 years of experience.	Technical Editing
Mary Pat Smith	B.S., Animal Science; 22 years of experience.	Technical Editing
Steve Irving	B.A., Philosophy; 21 years of experience.	GIS
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Mimi Reyes	B.F.A., Graphic Design; 23 years of experience.	Graphics
Amy Lehman	21 years of experience.	Word Processing
North State Resources		
Paul Uncapher	B.A., Geology; 33 years of experience.	Project Manager, Wild & Scenic Rivers; Land Use
Keith Marine	B.S., Wildlife and Fisheries Biology; M.S., Ecology; 28 years of experience.	Fisheries and Aquatic Ecosystems
Scott Goebel	B.A., Geography; 21 years of experience.	Land Use and Planning, Utilities and Service Systems, Public Services
Mike Gorman	B.S., Fisheries; 9 years of experience.	Fisheries and Aquatic Ecosystems
Wirt Lanning	B.S., Ecology and Systematic Biology; 18 years of experience.	Land Use and Planning, Public Services, Utilities and Service Systems
Duncan Drummond	B.S., Geology; 8 years of experience.	Geology, Geomorphology, Minerals, and Soils, Water Quality
Heather Kelley	B.S., Biology; 16 years of experience.	Botanical Resources and Wetlands, Wildlife Resources

Name	Qualifications	Participation
North State Resources (contd.)		
Len Lindstrand III	B.S., Wildlife Management; Minors in Fisheries Management and Forestry; 20 years of experience.	Botanical Resources and Wetlands, Wildlife Resources
Constance Carpenter	B.A., History; B.S., Range Resources with emphasis in Fire Ecology; M.S., Forest Resources; 22 years of experience.	Aesthetics and Visual Resources
Kathryn McDonald	B.A., English; 33 years of experience.	Writing and Technical Editing
Sylvia Cantu	A.A., Court Reporting; 31 years of experience.	Word Processing
Charles Shoemaker	B.S., Wildlife Biology (currently enrolled in M.S. program); 12 years of experience.	GIS
Tom Koler	Ph.D., Business Management/Geomorphology, 35 years of experience	Geology, Geomorphology, Minerals, and Soils, Water Quality
Michal Hupp	B.S., Forest Management, 38 years of experience	Land Use, Vegetation
Sara Tona	B.S., Genetics and Plant Biology, 4 years of experience	Botanical Resources and Wetlands, Wildlife Resources
Kurt Bainbridge	B.S., Wildlife Management and Conservation, 8 years of experience	Botanical Resources and Wetlands, Wildlife Resources
Teri Mooney	M.S., GIS science and Technology, 20 years of experience	GIS
Andy Lindeman	B.S., Civil Engineering, 4 years of experience	Geology, Geomorphology, Minerals, and Soils
Julian Colescott	M.S., Zoology and Physiology, 23 years of experience	Botanical Resources and Wetlands, Wildlife Resources
Tim Reilly	B.S., Soil Science, 36 years of experience	Geology, Geomorphology, Minerals, and Soils
Mariah McPherson	M.S., Civil and Environmental Engineering, 8 years of experience	Geology, Geomorphology, Minerals, and Soils

Shasta Lake Water Resources Investigation
Environmental Impact Report

Name	Qualifications	Participation
AECOM (contd.) (Under subcontract to MWH)		
Phil Dunn	B.S., Zoology; M.S., Fisheries Biology; 30 years of experience.	NEPA/CEQA Specialist
John Hunter	B.A., Environmental Studies; M.A., Ecological and Systematic Biology; Ph.D., Plant Biology; 23 years of experience.	NEPA/CEQA Specialist; Botanical Resources; Wildlife Resources
Stephanie Rasmussen	B.S., Environmental Biology and Management; 8 years of experience.	EIS Coordination
Kerry McWalter	B.S., Environmental Engineering; M.E., Aquatic Ecology; 10 years of experience.	Water Quality
Kara Baker	B.A., Political Science and Environmental Science; M.S., Civil and Environmental Engineering; 7 years of experience.	Water Quality
Chris Fitzer	B.A., Geography (Environmental Concentration); MURP, Environmental Planning (Watershed/Water Resource Concentration); 15 years of experience.	Fisheries and Aquatic Ecosystems
Stephen Pagliughi	B.S., Fisheries and Wildlife Science; M.S., Fisheries Biology; 20 years of experience.	Fisheries and Aquatic Ecosystems
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Kelly Holland	B.A., Environmental Studies; M.S., Environmental Science; 15 years of experience.	Wildlife Resources
Petra Unger	M.S., Botany (minors in Soil Science and Zoology); 16 years of experience.	Botanical Resources and Wetlands
Jim Vogel	B.S., Forest Recreation Resource Management; M.S., Forest Recreation Resource Management; Ph.D., Natural Resource Recreation and Tourism; 14 years of experience.	Recreation and Public Access

Name	Qualifications	Participation
AECOM (contd.) (Under subcontract to MWH)		
Anne Ferguson	B.S., Natural Resource Recreation and Tourism; M.S., Environmental Sustainability; 10 years of experience.	Recreation and Public Access
Andrew Bayne	B.A., Health and Human Performance; 10 years of experience.	Transportation and Traffic
Jenifer King	B.S., Biology; 17 years	Socioeconomics, Population, and Housing; Environmental Justice; Agriculture and Important Farmlands; Other Required Disclosures
Julie Nichols	B.A., Political Science (with honors); M.S., Journalism; 21 years of experience.	Technical Editing
Lisa Clement	B.S., Environmental and Resource Sciences; 13 years of experience.	GIS
Brian Perry	28 years of experience.	Graphics
Charisse Case	16 years of experience.	Word Processing
Hanson Environmental, Inc. (Under subcontract to MWH)		
Chuck Hanson	B.S., Fisheries Biology; M.S., Fisheries Biology; Ph.D., Ecology and Fisheries Biology; 32 years of experience.	Delta Fisheries and Aquatic Ecosystems
Kristie Karkanen	B.A., Communications; 7 years of experience.	Delta Fisheries and Aquatic Ecosystems
Far Western Anthropological Research Group, Inc. (Under subcontract to MWH)		
Brian Byrd	B.A., Anthropology; M.A., Anthropology; Ph.D., Anthropology; 35 years of experience.	Cultural Resources
William Hildebrandt	B.A., Anthropology; M.A., Anthropology; Ph.D., Anthropology; 35 years of experience.	Cultural Resources
Kelly McGuire	B.A., Cultural Anthropology; M.A., Cultural Anthropology; 35 years of experience.	Cultural Resources

Shasta Lake Water Resources Investigation
Environmental Impact Report

Name	Qualifications	Participation
Far Western Anthropological Research Group, Inc. (contd.) (Under subcontract to MWH)		
Melissa Cascella	B.A., History; B.S., Anthropology; M.A., Cultural Resources Management; 8 years of experience.	Cultural Resources
Wendy Masarweh	A.A., Anthropology and Art; UC Berkeley Extension Graphic Design Certificate Program; 22 years of experience.	Cultural Resources
Anna Starkey	B.A., Anthropology; 4 years of experience.	Cultural Resources
Aaron Buehring	B.A., Anthropology; 5 years of experience.	Cultural Resources
Ryan Mitchell	B.S., Evolution and Ecology; B.S., Anthropology; 5 years of experience.	Cultural Resources
Kathleen Montgomery	A.A., General Education; B.A., Communications, Graphic Arts; 6 years of experience.	Cultural Resources
Daniel Troglin	B.A., Anthropology; 9 years of experience.	Cultural Resources
Melissa Johnson	B.S., Anthropology; B.A., History; 4 years of experience.	Cultural Resources
Paul Brandy	B.S., Wildlife and Conservation Biology; M.S., Natural Resources Management (Wildlife); 10 years of experience.	GIS
Sharon A. Waechter	B.A., Anthropology; M.A., Anthropology; M.A. English; 35 years of experience.	Cultural Resources
Tammara Norton	B.A., Anthropology; B.A., Art; 30 years of experience.	Word Processing
Alejandra Jimenez	Degree in process, Anthropology; 2 years of experience.	Word Processing
Lin Wang	A.A., Accounting, International Accounting System; B.A., Accounting; 20 years of experience.	Word Processing
Jennifer Collier	16 years of experience.	Word Processing
Andrea Kuhner	B.S., Chemistry; 9 years of experience.	Word Processing

Name	Qualifications	Participation
JRP Historical Consulting (Under subcontract to MWH)		
Stephen Wee	M.A.. History; 34 years of experience.	Cultural Resources
Mark Beason	M.A.. History; 5 years of experience.	Cultural Resources
Steven Melvin	M.A.. Public History; 6 years of experience.	Cultural Resources
Ascent Environmental (Under subcontract to MWH)		
Honey Walters	BS environmental science and chemistry MS atmospheric science 15 years	Senior Air Quality, Climate Change, and Noise Specialist
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URS (Under subcontract to MWH)		
Elena Nilsson	M.A., Anthropology; 32 years of experience.	Cultural Resources
Cascade Economics (Under subcontract to MWH)		
Michael Taylor	A.B., Computer Science; M.S., Agricultural and Resource Economics; Ph.D., Agricultural and Resource Economics; 25 years of experience.	Socioeconomics
Westwater Research (Under subcontract to MWH)		
Harry Seely	B.S., Economics; M.S., Natural Resources and Agricultural Economics; 18 years of experience	Socioeconomics
MGE Engineers (Under subcontract to MWH)		
Bob Sennett	B.S., Civil and Structural Engineering; M.S., Civil and Structural Engineering; 20 years of experience.	Engineering

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Chapter 28, “DEIS Distribution List”

None.

Chapter 29, “List of Preparers”

None.

Chapter 31

Index

A

access roads: 2-(32, 70, 82). 7-283. 12-(142, 145). 13-(180, 190). 14-(5, 17). 17-25. 18-(29-33, 49-54, 62-66). 19-(15, 60, 64). 20-(25, 31). 26-3.

aesthetics: Chapter 19.

agricultural land: 1-(11, 15, 20, 23, 24, 28, 17, 18, 21). 2-9. 3-(62, 64). 4-(42-44). 6-17. Chapter 10. 11-(4, 9). 12-(27, 30, 32, 90, 97, 181). 13-(26, 64, 65, 83, 88, 248, 249). 17-7. 21-8. 26-(6, 8).

air basins: Chapter 5.

air quality: 1-(21, 27, 28). 3-(10, 16, 21, 50, 62, 64). 4-(41, 44, 46). Chapter 5. 9-1. 10-13. 17-(9, 25, 26). 20-(33, 34, 37, 38, 41, 44-46). 21-30. 24-15. 26-(1, 2, 6, 18, 21, 22).

air quality attainment plan: 5-24.

Alquist-Priolo Earthquake Fault Zone: 4-49.

Alquist-Priolo Earthquake Fault Zoning Act: 4-(15, 49).

alternatives—*see* CP1, CP2, CP3, CP4, *and* CP5

ambient air quality standards: 3-62. 5-(5-7, 10, 11, 14, 22, 24).

American River: 1-(22, 23). 3-(3, 15, 41, 42, 44, 60). 6-(2, 3, 8, 14, 31, 61, 64, 66). 9-1. 11-(5, 38, 60, 122, 123, 176, 224, 271, 298, 324, 328, 329, 331, 332, 334). 12-(2, 30, 122, 183). 17-(7, 19, 20, 24). 18-(45-48, 58-60, 72, 73, 79, 80, 85, 86, 91-95). 21-19. 23-2. 26-7.

anadromous fish species: 1-15. 11-91.

Anderson-Cottonwood Irrigation District: 1-20. 6-(1, 2, 28). 10-1. 11-(3, 47, 56). 12-88. 13-77. 18-12.

APE—*see* area of potential effects

aquatic habitat: 2-(8, 14, 28, 36, 54, 56, 59, 60-62, 95, 100). 3-(28, 32, 41). 4-(58, 61, 62, 70, 77, 84, 89, 94, 97-105). 6-21. 7-(86, 133, 177, 220, 230). 10-23. Chapter 11. 12-(145, 165). 13-(28, 57, 96-98, 126, 219). 25-(12, 13, 18, 22-24, 28-30, 33, 37-39). *see also* fish habitat

ARB—*see* California Air Resources Board

archaeology: 3-51.

area of potential effects (APE): 14-(13-15).

areas of controversy: 1-(31, 32, 37, 38).

B

BA—*see* biological assessment

Bay-Delta—*see* San Francisco Bay/Sacramento–San Joaquin River Delta (Bay-Delta)

beneficial uses: 1-(13, 36). 2-(29, 41, 44, 48, 56, 63). 3-(26, 27, 32, 38, 60). 6-(21, 22, 34). 7-(1, 3, 4, 6, 8, 11, 17, 18, 20, 24, 28, 29, 31, 33, 34, 39-

1 41, 43-49, 80, 82, 84-89, 128, 129, 131-134, 172, 173, 175-177, 178,
2 216-222, 225, 226, 228-231, 270-274). 11-(8, 36). 12-72. 17-19. 21-23.
3 best management practice (BMP): 2-(26, 29, 30, 32). 5-30. 7-(22, 24, 25, 80, 81,
4 84, 88, 128, 172, 225, 271, 278, 282, 283, 284). 9-45. 11-92. 12-178. 21-
5 22.
6 Big Backbone Creek: 4-(1, 8, 23, 24, 27, 53). 11-(53, 206, 251). 12-(38).
7 biological assessment (BA): 1-(1, 34). 2-(3, 20, 40). 3-(4-6). 7-(27, 28). 11-33.
8 26-(14, 19).
9 biological opinion (BO): 1-(2, 8, 34). 2-(18, 19, 40). 3-(4-6, 13, 24). 6-(13, 14,
10 15), 7-(11, 12, 27, 28, 87, 177, 221). 11-(5, 33-35, 326). 12-(83, 123).
11 13-(76, 131, 133, 157, 179, 208, 242).
12 BLM—*see* U.S. Bureau of Land Management
13 BMP—*see* best management practice
14 BO—*see* biological opinion
15 boat launching: 2-25. 18-(6, 14, 39, 41, 45, 56-59, 69-71, 76, 79, 83, 85). 19-(5,
16 68, 72). 21-33.
17 boating: 1-27. 3-61. 7-8. 17-(5, 7, 13). Chapter 18. 19-(4, 12, 64). 20-(5, 31).
18 22-7.
19 boating safety: 18-(7, 38). 22-7.
20 Butte County: 3-(30, 31). 5-1. 6-28. 7-35. 8-20. 10-(3, 6). 12-(34, 51, 53). 16-(4,
21 7). 17-16.
22
23 **C**
24 CAA—*see* Clean Air Act
25 CAAQS—*see* California ambient air quality standards
26 Cal/EPA—*see* California Environmental Protection Agency
27 CALFED Bay-Delta Program: 1-4. 3-(11, 15). 6-21. 7-19. 11-(15, 31). 12-32.
28 13-31. 27-(5, 7).
29 CALFED Multi-Species Conservation Strategy (MSCS): 11-(10-15, 45).
30 12-(32-35, 51-57, 85, 98, 108, 125, 134, 143, 149, 156, 161, 162, 167,
31 170, 173, 178, 182). 13-(26-31, 58-61, 79, 94, 96, 97, 99, 100, 102, 105,
32 107, 112, 113, 117, 134-142, 144, 145, 147, 157-164, 167, 168, 180-
33 184, 196-200). 26-1.
34 CALFED Programmatic Environmental Impact Statement/Environmental
35 Impact Report (Programmatic EIS/EIR): 1-(36, 37). 3-(11, 38, 47). 4-(1,
36 101).
37 CALFED Programmatic Record of Decision (CALFED ROD): 1-(4, 13, 37).
38 2-(5-7). 3-(38, 47). 4-76. 6-(38, 39). 11-45. 12-85. 13-(79, 94, 134, 157,
39 196).
40 CALFED ROD—*see* CALFED Programmatic Record of Decision
41 California Air Resources Board (ARB): 1-27. 5-(7, 8, 10, 14, 17-20, 22-27,
42 29-31, 67). 28-3.
43 California ambient air quality standards (CAAQS): 5-(7, 14, 24).
44 California Bay-Delta Authority (CBDA): 3-36. 7-19. 11-45. 12-(85, 86). 13-79.
45 California Clean Air Act (CCAA): 3-62. 5-(14, 22). 26-21.
46 California Department of Boating and Waterways: 1-27. 3-61. 26-21. 28-2.

- 1 California Department of Finance: 16-14. 24-9.
2 California Department of Fish and Wildlife (CDFW): 1-(27, 33). 2-(6, 31, 50,
3 56). 3-(29-31, 36, 40, 48, 58, 59). 4-48. 6-(20, 37). 11-(10-15, 17, 18,
4 19, 25, 26, 35-38, 41, 45, 48, 54, 55, 59, 70, 71, 144, 193, 240, 315, 330.
5 12-(32, 33, 52-55, 75, 82-84, 86, 90, 92, 95, 121, 158, 161, 162, 164,
6 166, 169, 172, 174-176, 180, 181, 183, 184, 186). 13-(25-27, 73, 75-77,
7 79, 82, 84, 87, 133, 217-228, 230, 242-243, 248). 18-(8, 13, 15, 19).
8 22-(6, 7). 25-(7, 15, 16). 26-(14, 19). 27-5. 28-2.
9 California Department of Parks and Recreation (State Parks): 1-27. 5-20. 7-24,
10 18-(13, 15, 20). 28-2.
11 California Department of Toxic Substances Control: 1-27. 6-25. 9-(11, 18).
12 21-(24, 25). 28-3.
13 California Department of Transportation (Caltrans): 1-27. 2-32. 3-(44, 45, 64).
14 5-66. 8-(8, 9, 12, 28). 9-(18, 19, 29, 32, 36, 39, 42, 44, 45). 12-58. 17-2.
15 19-(73, 99). 20-(2, 6, 51). 21-(15, 16). 26-22. 28-3.
16 California Department of Water Resources (DWR): 1-(9, 22, 24, 27, 32, 33).
17 3-(4, 5, 16, 30, 31, 34-37, 39, 40, 42, 44, 61). 6-(5, 6, 11, 13, 21-24,
18 31-38). 7-(18, 33-35, 37-39). 10-22. 11-(5, 26, 35-38, 53, 66, 79). 12-30.
19 13-27. 16-(19, 21). 21-23. 23-(1, 3, 4-8). 27-5.
20 California Endangered Species Act (CESA): 1-(8, 13, 27). 3-(58, 62). 11-(41,
21 45). 12-(82, 83, 85, 181). 13-(64, 65, 75, 76, 79, 248). 26-19.
22 California Environmental Protection Agency (Cal/EPA): 5-18. 6-11. 9-(18, 27,
23 29, 31, 33, 35, 36, 39). 16-10. 21-24. 28-3.
24 California Environmental Quality Act (CEQA): 1-(1, 5, 36).
25 California Geological Survey (CGS): 4-(15, 22).
26 California Highway Patrol (CHP): 1-27. 9-(18, 19, 26, 29, 32, 36, 39, 42, 44,
27 45). 22-(2, 6, 7). 28-3.
28 California Native Plant Protection Act (CNPPA): 3-62. 12-83. 26-19.
29 California Native Plant Society (CNPS): 3-63. 12-(2, 32, 33, 35, 51, 55, 57, 84,
30 181, 183, 184). 26-20.
31 California Natural Diversity Database (CNDDDB): 12-(2, 33, 51, 55, 56, 84).
32 13-(2, 28, 61, 64, 77, 128).
33 CalSim-II model: 3-(4, 16). 6-(31-33, 39, 49, 75, 82) 7-(37-39, 56, 78, 79, 82,
34 126, 127, 130, 170, 171, 174, 214, 215, 217, 227, 267, 268). 10-(24,
35 26-28, 32). 11-(49, 50, 52, 53, 59, 66, 67, 80, 81, 86, 122, 149, 152, 175,
36 198, 203, 223, 244, 247, 270, 298). 12-(91, 99, 103). 13-(86, 126, 130,
37 173, 178, 179). 16-(20, 21). 18-(24, 25, 38-43, 45-48, 95). 23-(7-9, 11).
38 25-(22-24).
39 Caltrans—*see* California Department of Transportation
40 campgrounds: 1-(29, 32). 2-(25, 36, 83). 9-(7, 25). 12-(1, 38, 58, 78, 108, 126,
41 143). 13-(1, 222). 14-5. 17-(5, 13, 26, 36). Chapter 18. 19-(2, 4, 5, 7, 12,
42 13, 15-19, 59, 60, 63-72, 81, 83, 84, 86, 89, 91, 95). 21-(11, 30, 33).
43 22-(15, 19, 21, 23). 24-2. *see also* camping
44 camping: 12-78. 17-2. Chapter 18. 19-(4, 12, 68, 69). *see also* campgrounds
45 canoeing: 7-(29, 86). 17-5. 18-41.

1 carbon monoxide (CO): 3-62. 5-(3, 4, 7, 25, 26, 28, 29, 31, 33, 34, 35, 38, 40,
2 41, 46, 47, 50-52, 55, 56, 59-61).
3 carryover storage: 1-8. 2-(18, 21, 24, 41, 48, 54, 63, 94). 6-(5, 16). 7-(81, 83,
4 84, 131, 175, 218, 228). 11-335.
5 CBDA—*see* California Bay-Delta Authority
6 CCAA—*see* California Clean Air Act
7 CDFW *see* California Department of Fish and Wildlife
8 Census Bureau—*see* U.S. Census Bureau
9 Central Valley fall-/late fall–run Chinook salmon: *see* fall-/late fall–run
10 Chinook salmon
11 Central Valley Project Improvement Act (CVPIA): 1-(2, 4, 13, 15, 36). 2-(38,
12 43, 46, 50, 54, 60). 3-(13, 15, 19, 23, 25, 34). 6-(13, 15, 16). 7-9. 11-(3,
13 30, 31, 36, 37).
14 Central Valley Regional Water Quality Control Board (CVRWQCB): 2-(29,
15 32). 3-(21, 47, 61). 7-6. 9-(8, 11). 11-(30, 45, 336-340). 12-(73, 86).
16 13-79. 21-12. 26-13. 28-3.
17 CEQ—*see* Council on Environmental Quality
18 CEQA—*see* California Environmental Quality Act
19 CESA—*see* California Endangered Species Act
20 CGS—*see* California Geological Survey
21 Chinook salmon: 1-(6-9). 2-(38, 43, 46, 52, 53, 56, 57, 60, 87, 95, 97, 100).
22 3-(5, 19, 23, 25, 28, 30, 31-33, 47). 6-(14, 20, 47). 9-11. Chapter 11.
23 18-(44, 58, 71, 77, 84). 25-14.
24 CHP—*see* California Highway Patrol
25 circulation: 7-7. 11-64. 17-(21, 22). 20-(7, 26, 32, 56, 57). 22-(13, 18, 20,
26 22-25). 27-5.
27 Clean Air Act (CAA): 1-27. 3-50, 4-46. 5-(10-14, 22, 24). 9-12. 26-18.
28 Clean Water Act (CWA): 1-(26, 28, 36). 2-(29, 30, 32, 102). 3-(20, 26, 46-49,
29 61, 62), 4-(45, 46, 48, 49). 6-24. 7-(3, 13, 14, 18-22, 24, 25, 31, 278).
30 9-12. 11-(29, 30). 12-(27, 72, 73, 96). 13-(73, 77). 21-21. 26-(11, 13).
31 climate: 1-(12, 37). 3-(1, 10, 21). 4-(27, 30, 43, 46, 65, 72, 79, 101-105).
32 Chapter 5. 6-(134, 135, 137-141). 9-(2, 4). 10-(2, 3, 19). 11-(2, 17, 18,
33 78, 335-341). 12-(29, 57, 181, 184-188). 13-(248-252). 18-(2, 11,
34 96-97). 19-99. 23-(25-27). 26-(1-2, 8, 18).
35 climate change: 1-(9, 11, 12). 3-(2, 3, 10, 13, 16, 25, 27). 4-(101-105). 5-(1, 9,
36 12, 15, 17-22, 29, 30, 34, 45, 49, 54, 59, 64, 69, 70, 72). 6-(134, 135,
37 137-141) 7-(285, 287-289). 9-48. 10-(13, 27, 28, 51-53). 11-(78,
38 335-341). 12-(181, 184-188). 13-(248-252). 18-(96-97). 23-(25-27).
39 26-8.
40 CNDDDB—*see* California Natural Diversity Database
41 CNEL—*see* community noise equivalent level
42 CNPPA—*see* California Native Plant Protection Act
43 CNPS—*see* California Native Plant Society
44 CO—*see* carbon monoxide
45 COA—*see* Coordinated Operations Agreement

1 Colusa County: 3-32. 5-1. 6-28. 7-35. 8-20. 10-3. 13-131. 16-7. 24-(5, 12).
2 17-16.
3 common plant communities: 12-27.
4 community-noise-equivalent-level (CNEL): 3-64, 8-(5, 8-10, 12, 13, 16, 18, 29,
5 29).
6 Comprehensive Environmental Response, Compensation, and Liability Act
7 (Superfund): 9-(8, 12, 18, 21). 7-16.
8 Comprehensive Plan 1—*see* CP1
9 Comprehensive Plan 2—*see* CP2
10 Comprehensive Plan 3—*see* CP3
11 Comprehensive Plan 4—*see* CP4
12 Comprehensive Plan 5—*see* CP5
13 concrete: 1-18. 2-(34, 68-70, 76-79, 92). 4-(32, 64, 70, 77, 84, 89, 102-105).
14 5-(33, 34, 46, 50, 54, 59). 6-1. 8-(25, 26). 9-51. 14-9. 16-(15, 23, 31).
15 19-8. 20-9. 21-33. 22-(18, 21). 26-(2, 7).
16 construction equipment: 2-(30, 76, 92). 3-64. 5-(25-27, 33, 41, 42, 45, 49, 53,
17 58, 67). 7-305. 8-(6, 7, 22, 25-28, 31, 35, 37, 38). 9-(23, 26, 29-31, 34,
18 38, 40). 13-(95, 110). 19-(81, 84, 86-89, 91, 94, 96-100).
19 construction footprint: 12-(109, 112). 13-(95, 135, 158, 230).
20 construction staging areas—*see* staging areas
21 consultation: 1-(1, 25-27, 38, 45). 2-(18, 28, 31). 3-(4, 5, 45, 48, 57). 6-13.
22 7-(12, 13, 27). 9-20. 11-(28, 29, 33, 38, 41, 70). 12-(72, 82, 92, 121,
23 161, 162). 13-(57, 65, 67, 73, 75, 131, 133, 190, 217, 220-228, 230, 242,
24 243). 14-(10-15, 17, 18, 29, 30). 22-11. 24-(9, 16, 20, 22, 25, 27).
25 26-(14, 16). 27-(1, 5, 6).
26 Contra Costa County: 3-(32, 37). 7-35. 8-20. 10-22. 16-31. 17-16. 24-(12).
27 cooperating agency: 1-(1, 26, 27). 26-15.
28 Coordinated Operations Agreement (COA): 2-40. 3-(5, 6). 6-(19, 24-25). 7-35.
29 11-(32, 33).
30 cottonwood: 2-(8, 64). 10-(17, 18). 12-(5, 6, 8, 23, 24, 27, 28, 31, 93, 99, 100,
31 103, 117-119, 164-166, 176). 13-(21, 23, 127).
32 cottonwood-willow woodland: 10-18. 12-31.
33 Council on Environmental Quality (CEQ): 2-(1, 27, 28, 101). 3-(2, 3, 9, 11).
34 5-(12, 13). 16-7. 19-98. 23-7. 24-(1, 7). 26-(12, 13).
35 CP1: 2-(16, 19, 23, 34-41, 42, 44, 45, 47, 49, 55, 56, 63, 66, 68, 69, 72-74, 78,
36 81-82, 84-86, 91, 100).
37 CP2: 2-(16, 19, 23, 36, 41-45, 47, 66, 68, 69, 72-74, 78, 81, 82, 84-86, 91, 100).
38 CP3: 2-(16, 19, 23, 36, 45-48, 55, 62, 68, 69, 72-74, 78, 81, 82, 84-86, 91, 100).
39 CP4: 2-(16-19, 23, 36, 48-57, 60, 64, 68, 69, 72-74, 78, 81, 82, 84-87, 91, 98-
40 100).
41 CP5: 2-(16, 19, 20, 23, 36, 57-63, 64, 68, 69, 72-74, 78, 81, 82, 84-87, 89-91,
42 100).
43 critical habitat: 1-15. 2-23. 3-(48, 72). 7-(12, 27). 11-(28, 34). 12-(54, 72, 101,
44 120, 130, 138, 144, 151, 152, 157, 184-187). 13-(58, 60, 66, 67, 128,
45 132, 156, 178, 195, 207).

1 cultural resources: 1-(27, 32, 34, 38). 2-(23, 91). 3-(2, 41, 51, 63). 6-34. 12-80.
2 Chapter 14. 17-(11, 18). 24-(9, 10, 16, 20, 22, 25, 27). 25-(19, 22, 26-28,
3 32, 33, 36, 37). 26-(2-4, 8, 18). 27-6.
4 cumulative impacts: 1-38. 3-(1, 10-17, 21, 22). 4-(101-105). 5-70. 6-134. 7-(3,
5 284, 285). 11-(334-341). 12-(182-188). 13-250. 15-4. 17-39. 19-(98,
6 99). 21-53. 22-30. 23-(24-27). 24-32. 26-(1, 2, 17).
7 CVPIA—*see* Central Valley Project Improvement Act
8 CVRWQCB—*see* Central Valley Regional Water Quality Control Board
9 CWA—*see* Clean Water Act
10
11 **D**
12 debris: 2-(32, 50, 54, 62, 88, 89, 92). 3-(47, 58). 4-(13, 17, 19, 20, 27, 49, 60,
13 76, 97-99). 5-23. 7-(26, 80, 282). 9-(5, 7, 8). 11-(18, 41, 80, 120, 327,
14 329-333). 12-177. 13-113. 14-(6, 8). 18-(7, 38). 21-50. 25-(17, 23).
15 Delta Protection Act: 10-20.
16 Delta Protection Commission: 7-19. 10-(22, 23). 28-3.
17 Delta Simulation Model 2 (DSM2): 6-(31, 33, 34, 36). 7-39.
18 delta smelt: 1-(15, 34). 3-(5, 34, 35). 6-(15, 37). 7-(12, 27). 11-(7, 9, 11, 28,
19 33-35, 38, 61, 62, 64-67, 69, 141-147, 190-196, 237-243, 273, 274,
20 312-318). 27-7.
21 dewatering: 11-(6, 18, 52, 58). 12-31.
22 diesel fuel: 26-4.
23 dikes: 2-(29, 35, 39, 44, 47, 55, 62, 64, 71, 72, 79). 3-(35, 49). 4-7. 5-(33, 35,
24 46, 50, 54, 59). 7-23. 12-1. 13-1. 17-(27, 32). 19-77. 21-34. 24-6. 26-13.
25 dissolved oxygen (DO): 7-(5, 7, 29). 11-(7, 18, 25, 92, 93). 25-23.
26 diversions: 1-(15, 17, 22, 23). 2-(8, 32, 96). 3-(23, 32, 33, 53, 58). 6-(1-5, 8, 9,
27 20-23, 36-39, 52, 53). 7-(6, 7, 13, 17, 18, 34, 35, 283, 287). 10-(1-3,
28 31-34). 11-(1, 4, 8, 32, 41, 47, 59, 61, 63, 73, 114, 122, 123, 171, 175,
29 176, 219, 223, 224, 266, 269, 271, 298, 334, 341). 12-(27, 31, 83, 98,
30 115, 122, 124). 13-(76, 81, 130, 131, 133, 177, 178). 18-(29, 49, 61, 74,
31 81). 21-(2, 5, 9-11). 23-12. 25-(6, 17, 18).
32 DO—*see* dissolved oxygen
33 docks: 8-(10, 15, 21). 9-15. 17-5. 18-(5, 6, 37, 49, 50, 62). 19-(17, 64, 66, 67,
34 72). 22-(7, 16).
35 drainage basin: 6-(2). 7-35. 26-13.
36 drainage pattern: 2-97. 12-(69-71).
37 dredged material: 7-37.
38 dredging: 6-36. 7-(16, 88). 11-(7, 25). 13-(74). 17-19.
39 drought: 1-(8, 9, 12, 13). 2-(15, 21, 26, 39, 49, 100). 3-(18, 36). 6-(12, 40-42,
40 75). 7-(79, 128, 216, 225). 10-(2, 4, 7, 13, 27, 28, 32-34, 37, 38, 40, 41,
41 43, 44, 46, 51). 11-(29, 79, 148, 243, 275, 335). 12-(91, 108, 125, 130,
42 142, 149). 13-126. 16-(20-22, 50). 18-24. 21-(6, 8). 23-(14, 16, 19, 21).
43 24-31. 25-(22, 31, 35).
44 dry years: 1-(9). 2-(37, 42, 44, 49). 6-(6, 40, 41, 45, 52, 95, 103, 122). 7-(53, 79,
45 83, 128, 225). 10-(4, 5). 11-(61, 63, 65, 68, 79, 114, 143, 147, 148, 192,
46 195, 196, 239, 242, 275, 299, 314, 318). 12-(108, 115, 116, 125, 130,

- 1 149). 16-(22, 33, 41, 49, 56, 62). 18-(7, 41, 45). 19-9. 21-6. 23-(13, 21).
2 25-(26, 31, 35).
3 DSM 2 Model—*see* Delta Simulation Model 2(DSM2)
4 dust, fugitive dust: 5-(4, 26, 33-35, 37, 38, 40, 41, 46, 47, 50, 51, 54-56, 59-61,
5 65, 66, 68).
6 DWR—*see* California Department of Water Resources
7
8 **E**
9 earthquake: 2-58. 3-36. 4-(14-16, 20-23, 34, 45, 46, 48, 49, 51, 56). 8-6. 22-11.
10 easements: 3-65. 9-(11, 24). 10-(19, 23). 11-48. 12-(90, 161-163). 13-(83, 84,
11 217-223, 225-229). 17-37. 18-21. 21-20. 26-22.
12 EC—*see* electrical conductivity
13 ecological reserves: 18-19.
14 ecosystem: 1-(3, 6, 9, 12-15, 17, 38). 2-(5, 10, 22, 23, 36, 39, 53, 54, 58, 100).
15 3-(1, 13, 14, 24, 27, 29, 31, 34-36, 41, 42, 59). 6-22. 7-(16, 226).
16 Chapter 11. Chapter 12. Chapter 13. 14-(24, 25, 27, 29). 9-(9, 16, 17).
17 17-(9, 10). 18-93. 22-9.
18 ecosystem restoration: 1-(4, 15, 37). 2-(26, 38, 39, 43, 47). 3-(13, 14, 24, 34, 36,
19 41, 43). 7-(19, 225). 9-9. 14-17.
20 Ecosystem Restoration Program (ERP): 11-(31). 12-(85, 105). 13-79.
21 effluent: 3-33. 7-44. 21-(12, 15, 21).
22 elderberry shrubs: 13-(58, 126, 190, 192, 214, 241-244, 247).
23 electrical conductivity (EC): Chapter 7.
24 electrical service and infrastructure: Chapter 21.
25 electricity: 1-16. 2-(22, 88). 8-10. 14-6. 16-(18, 67). 18-8. 23-(1-5). 26-4.
26 emergency services: 9-(1, 2, 18, 44, 45). 16-4. 21-(1, 20). Chapter 22.
27 employment: 10-13. Chapter 16. 20-8. 24-(2, 5, 6, 10, 10-15, 18, 21, 23, 26, 29).
28 26-(3, 6, 7). *see also* jobs
29 Endangered Species Act, California—*see* California Endangered Species Act
30 (CESA)
31 Endangered Species Act, Federal (ESA): 1-(8, 13, 26, 27). 2-31. 3-(5, 26, 31,
32 47, 48, 52, 58). 7-(12, 27). 11-(27, 28, 32-34, 38, 40, 41, 45, 123, 175,
33 223, 271). 12-(71-73, 82, 83, 85, 181). 13-(64-68, 75, 76, 79, 86, 131,
34 242, 248). 26-14.
35 energy: 1-(16, 27, 38). 2-(39, 99). 3-(2, 3, 15, 42, 43). 8-(2, 5, 26). 10-13.
36 11-(119, 122, 125, 175, 177, 223, 225, 270, 273, 298, 300). 16-(7, 11,
37 18, 32, 66). 21-(18, 19, 24). Chapter 23. 26-(4, 5, 18).
38 entrainment: 6-(15, 21, 22). 7-33. 11-(33, 56, 58, 65, 66, 67, 69, 97, 102, 107,
39 112, 144-147, 162, 165, 167, 170, 193-196, 210, 213, 215, 218, 240-
40 242, 256, 259, 262, 265, 274, 286, 289, 291, 294, 315-318, 326).
41 environmental commitments: 2-(23, 26, 34, 42, 45, 49, 58). 4-(52, 65, 67, 73,
42 74, 80, 81, 85, 86, 90, 91). 7-(80, 81, 128, 172, 219, 229). 11-(86, 91-93,
43 152, 159, 207, 208, 252, 253, 270, 282, 293, 297).
44 environmental justice: 3-(2, 54). 16-(9, 10). Chapter 24. 26-15.
45 Environmental Protection Agency—*see* U.S. Environmental Protection Agency
46 EPA—*see* U.S. Environmental Protection Agency

1 erosion: 2-(10, 29, 33, 67, 71). 3-(34, 41). Chapter 4. 7-(8, 9, 14, 25, 26, 31, 32,
2 35, 36, 39, 45, 80, 81, 84, 86-88, 128, 129, 132, 172, 173, 176, 219, 226,
3 228, 286). 9-(8, 14, 26). 11-(4, 18, 54, 62, 63, 80, 86, 91-93, 119-121,
4 124, 132, 136, 152, 203, 336-339, 341). 12-(30, 89, 99, 103, 114, 117,
5 118, 147). 13-(32, 83, 96, 98, 100, 127, 128, 131, 136, 138, 154, 155,
6 159, 161, 176, 178, 181, 189, 194, 197, 205, 207). 18-(50, 62). 19-(10,
7 95). 21-32. 25-(19, 26, 27, 32, 36, 37). 26-1.

8 ERPP—*see* Ecosystem Restoration Program Plan
9 ESA—*see* Endangered Species Act, Federal
10 ESU—*see* evolutionarily significant unit
11 ethnicity: 16-(1, 3, 5, 14). 24-(3, 9).
12 evolutionarily significant unit (ESU): 11-(28, 29).
13 excavation: 2-(68, 71, 73, 74, 79, 82, 89). 3-(44, 63). 4-(46, 50, 51). 7-(22, 26,
14 219, 229). 8-(24, 27, 30-32, 34). 9-25. 12-(73, 145, 146, 152). 13-(105,
15 106, 108, 111, 113, 117, 192, 206, 217, 229). 14-(6, 8, 12, 13). 17-36.
16 19-99. 21-(28, 49).
17 executive order: 3-(45). 5-(12, 17, 18, 20). 15-3. 16-9.
18 existing (2005) conditions: 4-(56, 57, 66, 68, 69, 75, 79-82, 86-88, 91-93,
19 97-101). 6-(10, 35, 39, 42, 44-46, 48-51, 53, 55, 57, 59-63, 65, 66,
20 68-71, 73-77, 81, 83, 85, 86, 88-102, 104-111, 113-119, 123-130).
21 7-(25, 36, 37, 41, 47-49, 53, 82, 83, 87, 94, 123, 130, 131, 133, 138,
22 164, 167, 174, 175, 177, 182, 208, 211, 217, 218, 221, 227, 228, 261,
23 264, 278, 285). 10-(26-29, 32-34, 37, 38, 40, 41, 43-47, 51). 11-(49,
24 52-55, 59-61, 65, 66, 72-76, 80, 81, 83, 84, 93-95, 97-100, 105, 109,
25 110, 113, 114, 116, 118, 122, 123, 126-146, 149-155, 159-201, 208-248,
26 253-318). 12-(32, 91, 97, 164). 13-(87, 91-93, 128, 176, 177). 16-(16,
27 18, 37, 41, 49, 62, 67). 18-(24, 26, 37, 39, 40, 43, 45, 46, 56, 59, 69, 72,
28 76, 79, 83). 19-(80-82). 23-(1, 11). 25-(22, 32, 36).
29 extended study area: 1-(17, 22-24, 28).
30

31 **F**
32 fall-/late fall-run Chinook salmon: 1-(6, 9). 11-(3, 5, 7, 11, 15, 37, 55, 56, 104-
33 113, 165-167, 169, 170, 213-215, 217, 259, 261, 262, 264, 265, 289-
34 291, 293, 294).
35 farming: 2-22. 3-2. 10-(6, 21). 11-63. 14-4.
36 Farmland Mapping and Monitoring Program (FMMP): 10-(7, 19, 25).
37 Farmland of Statewide Importance: 4-44. 10-(7, 11, 21, 22, 25).
38 Farmland Protection Policy Act (FPPA): 3-51. 10-16. 26-15.
39 faults: 3-39. 4-(2, 15, 20-22, 31, 49, 60).
40 Feather River: 1-(17, 22, 24). 3-(3, 44). 4-(69, 75, 82, 88, 93). 6-(2, 3, 7, 8, 28,
41 31, 61, 63). 10-6. 11-(5-7, 25, 46, 47, 60, 122, 123, 175, 176, 223, 224,
42 270, 271, 297, 298, 324, 328, 329, 331, 332, 334). 12-(30, 87, 122, 183).
43 13-(68, 80, 81). 18-(45-48, 58-60, 72, 73, 79, 80, 85, 86, 91-95). 23-4.
44 26-7.
45 Federal Endangered Species Act—*see* Endangered Species Act, Federal (ESA)
46 Federal Highway Administration (FHWA): 8-(7, 29). 20-6.

- 1 Federal Transit Administration (FTA): 3-(44, 55, 64). 8-(11, 28). 26-18.
 2 FHWA—*see* Federal Highway Administration
 3 field crops: 10-(2, 3). 13-26.
 4 fire protection: 1-27. 2-85. 8-10. 9-(1, 4, 17, 28). 16-4. 17-(19, 29). 21-(1, 6,
 5 8-10). Chapter 22.
 6 fish habitat: 2-(8, 10, 36, 57-59, 61, 64, 90, 98, 90). 3-(23, 24, 48). 4-(29, 88).
 7 6-41. 7-(25, 225). 9-37. Chapter 11. 12-149. 13-196. 17-(11, 18). 18-(38,
 8 56, 69, 75, 82). 23-21. 25-35. 26-14. *see also* aquatic habitat
 9 fish migration: 2-8. 3-25. 11-(21, 24, 91, 123, 175, 223, 271).
 10 fish mortality: 11-(144, 240, 316).
 11 fish protection: 3-34.
 12 fishing: 3-(54, 59). 7-(8, 20). 11-(9, 54). 12-86. 14-5. 17-(5, 7, 13). Chapter 18.
 13 19-(4, 12, 64, 69). 20-5. 25-(7, 9, 20, 28).
 14 flood control: 1-(3, 12, 15, 24). 2-(9, 14, 22, 37, 39, 40, 42, 46, 49, 58, 97).
 15 3-(14, 26, 29, 33, 34, 37, 40-42, 50, 60). 4-52. 6-(3, 7, 18, 27, 34, 35).
 16 7-(4, 36, 82). 11-(1, 3-8, 38, 62, 132, 136, 334). 13-248. 16-(18, 27, 30,
 17 37, 38, 45, 47, 48, 53, 54, 59, 60, 67). 26-20.
 18 flood management: 1-(12, 15). 2-(9, 10, 22, 40, 97). 3-(14, 40). 6-(1, 6-9, 13,
 19 17-19, 34, 35, 42, 89, 95, 104, 112, 120, 123, 135-141). 26-(7, 8).
 20 flooding: 1-(15, 16). 2-22. 3-40. 4-61. 6-8. 11-(12, 125). 12-(69-71, 96, 110,
 21 116, 122, 126, 135, 143, 150, 181). 13-(63, 114, 145, 155, 167, 176,
 22 178, 249). 16-(17, 27, 28, 30, 36, 37, 39, 45, 46, 48, 53, 54, 59, 60, 64).
 23 17-28. 18-97. 24-(5, 17, 18, 20, 22, 23, 25, 26, 28). 26-8.
 24 floodplain bypasses: 11-(4, 6, 124-126, 176, 177, 225, 272, 299). 12-(30, 31).
 25 FMMP—*see* Farmland Mapping and Monitoring Program
 26 Folsom Lake—*see* Folsom Reservoir
 27 Folsom Reservoir (Folsom Lake): 1-(22, 23). 6-(8, 61, 64, 65). 11-(38, 122,
 28 123, 176, 224, 271, 298). 18-(46, 48). 26-7.
 29 forbs: 12-(21-26). 13-(19-22, 24, 62).
 30 FPPA—*see* Farmland Protection Policy Act
 31 FTA—*see* Federal Transit Administration
 32 fuel: 2-(30, 90, 91). 3-34. 5-(3, 9, 11, 14, 19, 21, 31, 44, 48, 49, 53, 58, 62, 65,
 33 67). 7-(282, 283). 9-(1, 4, 5, 8-10, 14, 16, 24, 25-27, 31, 34, 38, 40).
 34 11-93. 12-(77, 79). 13-(72, 96, 98). 17-(9, 17). 22-9. 26-4.
 35
 36 **G**
 37 gasoline (gas): 5-(3, 4, 11, 33, 39). 6-25. 9-(23, 31, 34). 18-(5, 6). 19-61. 21-(1,
 38 10, 18, 19, 28). 26-4. *see also* petroleum
 39 geographic information system (GIS): 2-10. 4-(53, 54, 62, 70, 77, 84, 89).
 40 11-21. 12-(36, 109). 13-84. 25-4.
 41 geologic hazards: Chapter 4. 7-(35, 36). 21-32.
 42 geology: Chapter 4. 7-(9, 25, 39, 45, 80, 81, 129). 12-36. 19-1. 25-(4, 12, 21,
 43 22, 26, 27, 29, 32, 33, 36-38).
 44 geomorphology: Chapter 4. 7-(9, 35, 45, 80, 81, 129). 11-(1, 121). 12-(30, 142,
 45 180). 13-180.
 46 giant garter snake: 13-(59, 62, 64).

1 GIS—*see* geographic information system
2 glare: 19-(6, 10, 11, 80-88, 90-100). 26-2.
3 Glenn County: 3-32. 5-1. 6-(11, 28). 7-35. 8-20. 10-3. 11-44. 12-(84, 85, 119).
4 13-(77, 78, 131). 16-(3-5, 7). 18-18. 20-3. 24-(5, 12). 17-16.
5 global study area—*see* climate change
6 Governor’s Office of Planning and Research (OPR): 3-(34, 64). 5-(15, 17, 20,
7 21, 22, 30). 8-12. 24-8.
8 grading: 2-(74, 86-88). 3-(63, 65). 4-(46, 50-52, 86, 91). 5-(26, 41, 57, 65, 66).
9 7-(22, 35, 36, 219). 8-(24, 25, 30). 12-(145, 146). 13-(74, 105, 106, 108,
10 111, 113, 117, 191-193, 206). 17-12. 18-92. 19-(6, 10). 21-50. 26-22.
11 grains: 2-(59, 61, 90). 4-35.
12 grassland: 2-20. 3-(13, 16, 20, 21). 9-4. 12-(5-7, 22, 27, 31, 35, 51-54, 58-60,
13 79, 93, 113, 128, 137). 13-(5, 6, 19, 25, 62, 63, 65, 120, 149, 171).
14 18-11. 22-3.
15 greenhouse gases (GHG): 3-(2, 3, 10, 27). Chapter 5.
16 ground shaking: 4-(14, 15, 20, 49, 51, 56, 60).
17 ground-disturbing activities: 2-29. 7-(84, 132, 176, 219, 228, 278, 279). 12-(75,
18 114, 115, 129, 137, 143, 147, 151). 13-(70, 95).
19 groundwater: 1-22. 2-(9, 96). 3-(17, 30, 33, 59, 61). 4-(34, 42, 43). Chapter 6.
20 7-(8, 14, 19, 28, 38). 9-9. 10-(1, 2, 4, 7, 12, 33, 35). 11-(21, 123, 175,
21 176, 223, 224, 271, 298). 12-(29, 69-71, 73, 83, 92, 120). 13-(73, 77,
22 85). 21-(2, 5-11, 20, 23). 26-(8-10).
23 groundwater quality: Chapter 6. 7-(3, 36).
24 growth-inducing impacts: 1-38. 26-9.
25
26 **H**
27 haul routes: 11-93. 20-(9, 25, 32, 34, 38, 42, 45, 47, 52, 53, 56).
28 hazardous materials: 2-(30, 32). 7-282. Chapter 9. 11-(93, 159). 21-24. 24-15.
29 hazardous waste: 1-27. Chapter 9. 21-(17, 21, 24, 33, 34, 38, 40, 41).
30 Hazardous Waste Control Act: 9-(17, 18). 21-24.
31 heavy metals: 7-(4, 17, 46, 88, 286). 9-(8, 10). 11-48. 12.-88. 13-81.
32 herbicides: 6-12. 9-(7, 9). 12-177. 13-242.
33 high water: 2-(32, 40). 6-18. 7-12. 11-(4, 6). 12-(30, 73). 13-(23, 32, 74). 14-23.
34 18-(19, 32). 19-(7, 11, 65, 69, 70). 24-(4, 16). 25-29.
35 high-flow events: 4-(66-68, 74, 75, 81, 82, 86, 87, 91-93, 102-105). 7-86. 11-4.
36 12-(31, 187). 13-(91, 250-252). 16-(28, 30). 18-96.
37 historic buildings: 19-80.
38 historical resources: 14-(11, 12, 19, 20-22, 24, 25, 27, 28-31). 25-(4, 12, 19, 27,
39 33, 37).
40 houseboats: 1-32. 2-79. 12-94. 18-(1, 2, 6). 19-4. 20-5.
41 human remains: 14-(7, 12, 20).
42 hunting: 3-54. 13-75. 14-4. 15-3. 17-(10, 13). 18-(11, 12, 15, 19). 19-4.
43 hydraulics: 2-(40, 55, 99). Chapter 6.
44 hydrodynamics: 1-22. 6-(3, 31, 33). 7-(37, 39, 56). 11-(143, 190, 192, 239,
45 314).
46 hydroelectric power: 1-2. 14-5. 23-(1, 4).

- 1 hydrologic modeling: 7-(85, 87, 286). 11-(49, 126, 129, 133, 136, 177, 180,
2 182, 184, 225, 227, 230, 232, 299, 302, 305, 307).
3 hydropower: 1-(2, 6, 13, 16, 24). 3-(15, 43, 57). 6-(34, 41). 11-(20, 197).
4 12-134. 21-(1, 19). Chapter 23. 25-35. 27-4.
5
6 **I**
7 I-5—*see* Interstate-5
8 income: 2-(25, 27). 3-54. 10-13. Chapter 16. 24-(1-3, 5-29, 30-32).
9 Indian tribes: 14-(13, 14). 15-3. 16-9. 25-6. *see* Native Americans
10 Indian Trust Assets (ITA): 3-56. Chapter 15. 26-17.
11 industry: 3-38. 8-21. 10-3. 11-44. 12-84. 13-77. 14-(4, 5). Chapter 16. 17-16.
12 18-20. 21-32. 24-(2, 5, 6, 13). 26-(4, 7, 8). 27-3.
13 intactness: 19-(2, 3, 64, 69).
14 Interstate 5 (I-5): 2-(45, 52, 77, 96). 3-(44, 46). 8-(7-9, 28). 9-(8, 9, 27, 28, 32,
15 35, 38, 41). 12-(21, 68). 13-19. 14-5. 16-12. 17-(1, 2, 6, 21, 25). 18-2.
16 Chapter 19. 20-(1-5, 30, 32). 21-(15, 16, 18). 22-(6, 7, 14, 17, 68). 24-2.
17 26-21.
18 invasive species: 2-33. 3-(24, 55). 11-(24, 25, 31). 12-(27, 57, 61, 78-82, 181).
19 13-(25, 74). 26-18.
20 invertebrates: 11-(9, 18, 23, 26, 27, 61, 64, 120, 125, 129). 12-78. 13-(58, 62,
21 126, 190, 192). 25-(15-17).
22 ITA—*see* Indian Trust Assets
23
24 **J**
25 jet skis: 18-1.
26 jobs: Chapter 16. 24-(5, 15). 26-(6, 7). *see also* employment
27
28 **K**
29 kayaking: 18-41.
30 Keswick Dam: 1-20. 2-(8, 21, 24, 38, 43, 46, 50, 53, 60, 86, 87, 96). 3-29.
31 4-(16, 32, 43, 67, 86, 91), 6-(1, 2, 7, 14, 17-21, 35, 47, 49, 50, 52). 7-(4,
32 6, 11-13, 16, 30-32, 83, 86-89, 130, 174, 218, 286). 9-10. 11-(2, 3, 15,
33 16, 21, 22, 26, 33, 46, 47, 53, 54, 57, 91, 114, 119, 120, 124, 170, 171,
34 218, 219, 266). 12-(87, 89, 99, 130, 138, 151). 13-(80, 81, 83, 123-125,
35 128, 152, 153, 174, 175, 187, 188, 190, 203, 204). 14-(1, 5, 8). 17-21.
36 18-(8, 11-14, 18, 21, 40-43, 78). 21-(9, 18). 23-(1, 2).
37
38 **L**
39 lake alteration agreement: 2-32. *see also* streambed alteration agreement
40 Lake Oroville: 1-22. 4-91. 11-(123, 124, 225, 272, 299). 23-4. 26-7.
41 Land and Resource Management Plan (LRMP): 1-(14, 30), 31). 3-(52, 56).
42 4-47. 7-(24-26). 8-39. 9-(13, 14). 11-(38, 39). 12-(73-75, 80, 96).
43 13-(68-70). 17-(2, 8-10, 17, 18, 28, 29, 31, 32, 37, 39). 18-(16, 17).
44 19-(4, 5, 72-75, 80-82, 84-89, 91, 93, 94, 96-98, 100). 21-(21, 25, 32,
45 51). 22-(9, 10). 25-(3, 6, 12, 22, 25, 30, 38, 40). 26-(15, 16).
46 landfill: 2-(84, 91). 7-23. 8-(10, 15). 9-(7, 10, 11, 16, 21, 26, 29). Chapter 21.

1 landowners: 1-46. 2-33. 3-(35, 36, 62). 7-279. 9-19. 10-(3, 21). 11-(46, 47).
2 12-(75, 81, 86, 90). 13-(79-81, 83). 18-15. 21-32. 25-(3, 21).
3 landscaping: 3-(42, 63). 7-20. 12-(26, 78). 13-24. 21-5.
4 landslides: 4-(13, 17, 19, 20, 49, 56, 60, 76). 8-6. 22-11.
5 law enforcement: Chapter 22
6 leachfields: 21-31.
7 lead agency: 1-(1, 25, 26). 2-1. 3-8. 4-(46, 49). 5-(16, 21, 22). 12-84. 19-98.
8 26-(10, 12, 21). 27-7.
9 levees: 1-(4, 15, 16, 27, 36, 37). 2-(22, 53, 89). 3-(14, 22, 34, 35, 40-43, 60).
10 4-(22, 27, 30, 44, 45). 6-(3, 6-8). 7-23. 10-(4, 18). 11-(4, 5, 7, 125).
11 12-(30-32). 13-(126, 131, 248). 24-6.
12 level of service 20-(7, 8, 26).
13 level of significance (LOS): 3-8. 4-(94-96). 5-(23, 64). 6-(132, 133). 7-
14 (270-277). 8-36. 9-43. 10-49. 11-(320-326). 12-(156-160). 13-
15 (209-216). 14-31. 16-(63-65). 17-5. 18-(88-91). 19-93. 20-(48-50).
16 21-(25, 26, 47, 48). 22-(12, 25-27). 23-24. 25-40.
17 liquefaction: 4-(33, 34, 42, 43, 49, 51, 56, 57).
18 listed species—*see* special-status species
19 livestock: 2-90. 10-(2-4, 20). 11-25.
20 logging: 7-1. 11-92. 14-4. 20-35. 25-6.
21 LOS—*see* level of significance
22 LRMP—*see* Land and Resource Management Plan
23
24 **M**
25 M&I—*see* municipal and industrial
26 mammals: 7-(12, 22). 12-75. 13-(19, 21-26, 61, 64, 70, 126, 127, 191, 193).
27 marinas: 1-(16, 29, 32). 2-(25, 36, 67, 89, 81-83). 9-(7, 8, 14, 15). 11-19. 17-(5,
28 27-29, 36). 18-(2, 5, 6, 16, 28, 30-34, 36, 37, 48, 50-54, 60-62, 64-67,
29 73, 80, 92). 19-(2, 4, 5, 7, 9, 11, 61, 62, 64, 67, 70-72, 99). 21-(10, 11,
30 21, 30). 22-(14-16, 19, 21, 23). 24-2.
31 marsh: 11-(9, 11, 44). 12-(5, 8, 24, 28, 29, 31, 32, 35, 51, 53, 55, 56, 59-64, 85,
32 96). 13-(26, 62-64, 127, 191, 193).
33 maximum diversion: 21-5.
34 MBTA—*see* Migratory Bird Treaty Act
35 McCloud River: 1-(17, 18, 32, 33, 38). 2-(10, 57, 60, 64, 66, 75, 76, 83, 84, 89,
36 90). 3-(2, 15, 44, 60, 61). 4-(1, 17, 23, 24, 27, 57). 6-2. 7-3. 8-11. 9-(1,
37 4, 5). 11-(13, 17, 20, 24, 25, 42, 53, 76, 88, 89, 157, 205, 206, 251, 281).
38 12-(108, 126, 143). 13-(117, 249). 14-(3-5, 10, 11). 17-(1, 6, 26). 18-5.
39 19-(4, 18, 69, 70, 73, 74, 80). 20-(2, 5, 35). 21-15. 24-(4, 16). Chapter
40 25. 26-(2, 6, 16, 20). 27-7.
41 memorandum of understanding (MOU): 2-31. 3-47. 10-22. 25-7.
42 mercury: 4-33. 7-(3-7, 14, 16, 17, 24, 30, 31, 88). 9-(7, 9, 10, 25, 27, 37).
43 Migratory Bird Treaty Act (MBTA): 3-(51, 52). 13-(68, 75, 76). 26-14.
44 mineral resources: 3-(44, 45). 4-(1, 31-33, 56, 58, 64, 70, 77, 84, 89, 94). 17-14.
45 26-(1, 2).

- 1 mining: 1-(14, 17, 28). 2-(95, 97). 3-(21, 22, 24, 34, 62, 63, 75). 4-(19, 23,
2 28-32, 34, 48-50, 67, 68, 75, 82, 87, 92). Chapter 7. 9-(9, 10, 25).
3 11-(20, 48). 12-(24, 27, 38, 88). 13-(20, 21, 57, 82, 85). 14-(4, 7, 9.). 17-
4 (5, 11). 19-(59, 61). 26-21.
- 5 Mokelumne River: 6-(8, 9, 67).
6 MOU—*see* memorandum of understanding
7 MSCS—*see* CALFED Multi-Species Conservation Strategy
8 municipal and industrial (M&I): 1-(2, 3, 5, 9, 22, 24, 36). 2-(5, 7, 19, 21, 22, 24,
9 37-45, 47, 49, 54, 55, 58, 60, 61, 63). 3-(36, 39, 41). 6-(3, 5, 6, 10-12,
10 22, 40-42, 75-82, 95, 103, 112, 120, 123). 7-(4, 8, 17, 34, 35, 41, 43, 79,
11 128, 172, 216, 225). 10-(2, 6, 30, 34, 35, 38, 39, 41, 42, 45, 47). 11-(79,
12 148, 197, 244, 275). 12-(108, 125, 134, 142, 149, 184, 186). 17-(6, 8).
13 21-(2, 5-8, 10, 21). 23-(14, 16, 17, 20, 21). 25-(26, 31, 35). 26-9.
14
15 **N**
16 NAAQS—*see* national ambient air quality standards
17 NAHC—*see* Native American Heritage Commission
18 national ambient air quality standards (NAAQS): 3-51. 5-(10, 11).
19 National Environmental Policy Act (NEPA): 1-(1, 5, 24-26, 28, 34, 35, 36).
20 2-(1, 2, 20, 27, 57, 102). 3-(2-4, 6, 9, 17, 22, 42, 45, 46, 48, 56, 57).
21 4-(55-57): 5-(12, 27). 6-(33, 34). 7-(27, 28, 40). 8-(11, 22). 9-49. 10-(24,
22 25). 11-(35, 70, 71). 12-(95, 96). 13-(86-88). 14-(12, 18, 19). 16-(9, 10,
23 16, 17). 17-(23, 29). 18-25. 19-(74, 75, 79, 98). 20-(25, 26). 21-25. 22-
24 (11, 12). 23-(7, 9). 24-(1, 7, 8). 25-24. 26-(3-5, 10-13, 15, 16). 27-(1, 2,
25 5, 7).
26 National Historic Preservation Act (NHPA): 1-(27, 34). 3-50. 14-(7, 11, 12, 15,
27 22, 24, 26, 27, 29, 31-33). 24-(10, 16, 20, 22, 25, 27). 26-16.
28 National Marine Fisheries Service (NMFS): 1-(2, 8, 13, 26, 27, 34, 42). 2-(6,
29 19, 20, 31, 40, 50, 56). 3-(5, 6, 13, 15, 24, 32, 36, 47, 48). 6-(13, 14, 20).
30 7-(11-13, 27, 28, 133, 177, 221). 11-(5, 9-15, 21, 27-29, 31, 33-38, 50,
31 65, 70, 71, 78, 144, 147, 193, 196, 240, 243, 274, 315, 318, 326-328,
32 330, 331, 333, 335). 12-(71, 164, 166, 169, 172). 13-(66, 67, 131, 133,
33 157, 179, 208). 25-41. 26-14. 27-5. 28-2.
34 National Pollutant Discharge Elimination System (NPDES): 1-28. 2-29. 4-(46,
35 48). 7-(21, 22, 28, 31, 278). 9-11. 11-30. 12-73. 21-21. 26-21.
36 National Recreation Area (NRA): 1-(2, 4, 26-29). 2-(11, 25, 81, 84). 3-56.
37 4-(12, 31, 48). 9-(1, 2, 4, 8, 14). 11-40. 12-(77, 78). 13-72. 17-(2, 5, 6, 8,
38 10, 11, 14, 18, 23, 28, 29, 31, 32, 37, 39). 18-(1-3, 5, 16, 17, 27). 19-(4,
39 5, 12, 59, 60, 72-75, 78, 81, 82). 20-1. 21-(1, 22). 22-16. 26-16. 27-6.
40 National Register of Historic Places (NRHP): 3-51. 14-(7-9, 11, 13, 14, 18).
41 25-(20, 28).
42 national wildlife refuge: 9-11. 11-(46, 48). 12-(87, 88). 13-(80, 82). 18-15.
43 Native American Heritage Commission (NAHC): 1-28. 14-(25, 26, 28, 30).
44 24-4. 28-3.

1 Native American: 1-(28, 32, 34). 3-54. 4-32. 7-(20, 21). 12-(72, 73). 24-(4, 5,
2 9-11, 15, 16, 19, 22, 24, 25, 27, 29, 30-32). 25-(19, 20, 28, 32, 36).
3 26-(3, 17, 18). 27-(1, 3, 6). *see* Indian tribes
4 native plants: 2-(88, 89). 3-62. 12-(61, 77, 78, 83, 84, 96, 181). 13-242. 26-(19,
5 20).
6 natural community conservation plan (NCCP): 11-(45, 71). 12-(85, 95, 96).
7 13-(79, 87). 17-24.
8 natural gas service and infrastructure: Chapter 21.
9 Natural Resources Conservation Service (NRCS): 3-(51, 67). 10-(19, 20).
10 navigable waters: 3-49. 4-45. 7-22. 11-29. 12-73. 26-13.
11 NCCP—*see* natural community conservation plan
12 NEPA—*see* National Environmental Policy Act
13 nesting: 2-(10, 64). 3-58. 11-(18, 84). Chapter 13.
14 NHPA—*see* National Historic Preservation Act
15 NMFS—*see* National Marine Fisheries Service
16 No-Action Alternative: 2-(2, 20-23).
17 noise: 2-75. 3-(1, 64). 4-52. 7-33. Chapter 8. 11-(61-63). 13-(99-103, 105, 106,
18 108, 110, 111, 113, 137, 160). 16-10. 17-(22, 25-27, 36). 18-35.
19 21-(30-33, 37, 40, 42, 45). 24-15. 26-22.
20 nonnative plants: 2-10. 3-29. 12-(29, 57-60). 13-25.
21 NPDES—*see* National Pollutant Discharge Elimination System
22 NRA—*see* National Recreation Area
23 NRCS—*see* Natural Resources Conservation Service
24 NRHP—*see* National Register of Historic Places
25
26 **O**
27 OCAP—*see* Operations Criteria and Plan
28 odor: 5-(27, 28, 32, 42, 47, 52, 56, 61, 64, 70). 7-30. 21-31.
29 Office of Emergency Services: 9-(18, 45). 22-(2, 3).
30 Office of Historic Preservation: 1-27. 14-9. 28-3.
31 open space: 3-62. 10-(3, 12, 21, 23). 11-44. 12-(85, 90). 13-(78, 83). 17-(2, 6, 8,
32 13, 19, 29, 37). 18-(13, 15, 20-23). 19-95.
33 operations and maintenance: 2-(2, 23, 39, 44, 47, 49, 55, 63). 3-40. 9-(31, 34).
34 26-4.
35 Operations Criteria and Plan (OCAP): 1-(1, 34). 2-(20, 40). 3-70. 6-13. 7-(27,
36 28, 287). 11-(34, 50, 123, 175, 223, 271). 12-(122, 123). 13-(179, 208).
37 OPR—*see* Governor’s Office of Planning and Research
38 ozone: 3-62. 5-(3-8, 11, 24, 28, 33, 45, 49, 53, 58).
39
40 **P**
41 Pacific Gas and Electric Company (PG&E): 3-(15, 43, 44). 14-5. 21-(17, 18,
42 19). 23-11. 25-(7, 9, 11, 17-19, 23, 40). 26-18.
43 pedestrians: 18-(13-15). 19-71. 25-22.
44 permit: 1-(26-30). 2-(23, 26, 29, 32, 81). 3-(31, 46, 50, 60, 64, 65). 4-(45, 46,
45 49, 50, 52, 66, 73, 80, 85, 91). 5-(13, 14, 19, 22-24, 34). 6-(23, 38, 39).
46 7-(21-23, 28, 31, 32, 34, 35, 80, 128, 172, 278, 279). 9-(7, 13, 26).

1 11-(28-31, 41, 70, 72, 86, 92, 93, 123, 175, 223, 271). 12-(73, 79, 83,
2 92, 121, 145, 165, 166, 169, 172). 13-(67, 74, 76, 77, 133). 18-(6, 8, 14,
3 19, 79). 19-61. 21-(12, 16, 17, 21, 23, 25, 26, 34, 38, 40, 41, 49, 50).
4 22-28. 23-6. 26-(11, 13-15, 17, 20, 21, 22).
5 pesticides: 6-12. 7-(4, 5, 7, 17, 24, 30, 219, 229). 9-(7, 9). 11-20.
6 petroleum: 2-(81, 84, 85). 7-(84, 219, 228, 286). 9-(9, 21, 23, 25, 26, 29, 31,
7 34). 11-94. 22-3. *see also* gas, gasoline
8 PG&E—*see* Pacific Gas and Electric Company
9 picnicking: 17-5. 18-(5, 6, 11-16, 20, 29, 39, 49, 50, 51, 61, 62, 64). 19-(4, 17,
10 66, 67). 21-33.
11 pile driving: 8-(7, 26-28).
12 Pit River: 1-(17, 18, 20). 2-(8, 10, 64, 71, 89). 3-(44, 57). 4-(1, 8-10, 12, 23, 24,
13 27, 33, 57, 65, 67, 72, 73, 79). 6-2. 7-(3, 4). 8-11. 9-(1, 4, 5). 11-(12, 14,
14 17, 18, 20, 25, 46, 53, 76, 88, 156, 205, 206, 251). 12-86. 13-(30, 80,
15 249). 14-(3-5, 9-11, 18, 23). 15-3. 17-1. 19-(4, 5, 8, 15, 19, 57, 62, 66,
16 71, 72). 21-(15, 34). 24-(4, 9, 16, 19, 22, 24, 25, 27, 29, 31, 32). 25-9.
17 26-(3, 6, 18).
18 PM₁₀: 4-8. 5-(3-8, 25, 26, 28, 29, 31, 33-35, 38, 40, 41, 45-47, 49-52, 54-61, 65,
19 68-70).
20 PM_{2.5}: 4-46. 5-(3-8, 26, 33-34, 40, 41, 46, 47, 50-52, 54-56, 59-61, 70).
21 pollution, nonpoint-source: 3-61. 7-(3, 22). 12-83. 13-77. 21-21.
22 pollution, point-source: 3-61. 12-83. 13-77. 17-11. 21-21.
23 power: 1-(2, 36). 2-(25, 38, 47, 54, 61, 71, 82, 84, 86, 99). 3-(2, 18, 23, 41, 43).
24 5-(44, 53, 62). 6-(15, 16, 47). 7-(12, 29, 45, 86). 9-(7, 23, 24, 27). 10- 6.
25 11-(30, 50). 12-(146, 175). 13-(70, 121). 14-(5, 9, 11). 16-(19-22, 31-33,
26 40, 41, 49, 50, 55, 56, 61, 62, 65, 66). 17-(11, 27). 19-9. 21-(18, 19, 22,
27 24, 29, 31, 33, 37, 39, 40, 50, 51). Chapter 21. 22-(14, 19, 21). Chapter
28 23. 24-(4-6, 18, 21, 23, 24, 26, 29).
29 powerplants: 2-(35, 71, 96). 5-(34, 50, 59). 6-(1, 2, 18, 20, 47). 7-(23, 45, 84,
30 88). 9-11. 10-6. 14-5. 18-8. 21-34. Chapter 23.
31 precipitation: 1-(12, 18). 2-9. 4-(27, 33, 53, 54). 6-21. 7-185. 10-(5, 6, 51).
32 11-(2, 335). 12-70. 17-27. 18-(2, 11). 21-15. 25-17. *see also* rainfall *and*
33 snowfall
34 preconstruction surveys: 12-(158, 176, 180, 186). 13-(209-212, 214, 217, 219,
35 222-230, 232-237, 239-243, 245-247).
36 predation: 11-(8, 18, 23, 52, 56, 58, 59, 97, 102, 107, 112, 125, 162, 165, 167,
37 170, 210, 213, 215, 218, 256, 259, 262, 265, 286, 289, 291, 294).
38 13-227.
39 preferred alternative: 1-35. 2-(2, 101, 102). 3-39. 26-10.
40 prehistory: 3-51. 14-(12, 20). 25-(19, 28).
41 prey: 11-(16, 23, 92, 93). 13-(76, 90, 121, 149, 171, 184, 201, 212). 25-(15-17,
42 29). 26-2. *see also* predation
43 primary study area: 1-(17-21, 34, 35).
44 Prime Farmland: 4-44. 10-(7, 11, 20-22, 25).
45 project area—*see* primary study area *and* extended study area
46 propane: 9-9. 21-19.

1 public participation: 2-1. 3-(57, 58). 5-13.
2 public safety: 2-14. 9-16. 16-(3, 13). 17-(27, 36). 22-10.
3 public services: 2-37. 9-(1, 43, 44, 45, 47). 13-(134, 157, 180). 16-(4, 10).
4 17-17. 18-22. 21-(1, 21, 24, 32, 52, 53). Chapter 22. 24-(4, 5). 26-8.
5 public transportation: 17-22.
6 pumping capacity: 6-(22, 69). 23-5.
7 pumps: 2-(31, 79, 87). 3-(18, 34, 36). 5-39. 6-(4, 5, 10, 15, 17, 21, 23, 36).
8 7-(33, 283). 8-(7, 25). 9-23. 11-65. 14-6. 21-(6, 11, 15, 16, 33). 23-5.
9

10 **Q – not used**

11
12 **R**

13 railroad: 1-30. 2-(35, 36, 39, 44, 45, 47, 55, 62, 64, 71-73, 77-79). 3-53. 7-(1, 3).
14 8-38. 11-20. 12-27. 18-8. 19-(9, 58, 64). 20-(1, 3, 4, 31, 34, 36, 37, 39,
15 41, 44, 46). 21-(24, 34).
16 rainfall: 1-12. 4-33. 5-15. 6-7. 7-(48, 83, 87, 119, 131, 150, 158, 175, 218, 228).
17 18-(83, 96). 25-(18, 29). *see also precipitation*
18 raptors: 3-58. 13-(9, 19, 22, 24-26, 68, 70, 76, 110, 121, 127, 149, 171, 191,
19 193, 212, 214, 229-230, 234, 237, 240-241, 243, 247).
20 RBDD—*see Red Bluff Diversion Dam*
21 record of decision (ROD): 1-(4, 13, 25, 26, 28, 31, 37). 2-(5-7, 21, 40, 104).
22 3-(38, 47). 4-(47, 76). 6-(13, 16). 7-(27, 80, 128, 172). 11-(31, 35, 39,
23 45. 12-75-77, 85). 13-(27, 70-72, 79, 94, 134, 157, 196). 17-(11, 12, 18).
24 18-17. 26-(10, 11, 13-15). 27-(3, 7).
25 recreation: 1-(2, 6, 16, 24, 26, 27, 29, 30, 32, 38). 2-(7, 11, 14, 22, 24, 25,
26 36-39, 42-44, 46, 47, 49, 54, 55, 57, 58, 60, 62, 64, 67, 73, 79-84, 91,
27 96, 97, 100). 3-(2, 29, 36, 41, 50, 53, 56, 60, 61, 64). 4-88. 6-(34, 41).
28 7-(1, 4, 8, 11, 17, 20, 23-26, 29, 45, 86, 225). 8-(6, 7, 12, 13, 15, 17, 21,
29 25, 27, 30-32, 34, 35). 9-(1, 8, 13, 14, 16, 25, 28, 30, 34). 10-(13, 18,
30 45). 11-(10, 20, 25, 42, 44, 69, 274, 575). 12-(68, 77, 81, 84, 90, 115,
31 149-151). 13-(5, 73, 75, 77, 82, 84, 100, 103, 108, 134, 157, 180,
32 196-201). 14-(1, 5, 21, 24, 25, 27, 29). 17-(2, 5, 9, 10-14). Chapter 18.
33 19-(2-4, 59, 65, 67, 69-76, 78, 81-83, 86, 88, 90, 92, 94, 96-99). 20-(5,
34 8, 28, 31, 33, 37, 41, 44, 46). 21-(1, 6, 10, 11, 22, 27, 32-36, 38, 39,
35 41-46). 22-(15, 19, 21, 23). 23-21. 24-(2-4, 11, 15, 17, 18, 20, 22, 23,
36 25, 26, 28). 25-(3, 6, 7, 20, 27, 35). 26-(3, 4, 16, 20). 27-6.
37 recreational facilities: 3-61. 8-(7, 23). 9-(7, 8, 30, 34). 10-(45, 46). 13-(134, 157,
38 180). 17-(25, 26, 28, 30, 31, 33, 34). Chapter 18. 19-(61, 83, 86, 88, 90,
39 92). 20-(32, 33, 37, 41, 44, 46). 21-30. 22-(15, 21, 23). 26-3.
40 Red Bluff—*see Red Bluff Diversion Dam*
41 Red Bluff Diversion Dam (RBDD): 1-(9, 20, 22). 2-8. 6-(1, 2, 11, 15, 18-20,
42 32, 45-47, 50, 51). 7-(4-6, 8, 9, 11, 14, 15, 26, 28, 37, 43, 48, 49, 51, 54,
43 87, 88, 118, 119, 149, 150, 158, 181). 11-(3, 47). 13-81. 28-4.
44 Red Bluff Pumping Plant (RBPP): 1-(5, 9, 17-20, 22). 2-(5, 24, 38, 43, 46, 50,
45 53, 60, 86, 87, 95, 97, 100). 4-(13, 45, 86, 91). 6-(2, 5, 15, 20-21, 50,
46 52, 58). 7 (4, 31, 86, 89, 134, 178, 222, 231, 286). 9-1. 10-3. 11-(3, 15,

- 1 16, 31, 54-57, 114, 116, 117, 119, 122, 124, 125, 165, 170-173, 175,
2 218-221, 223, 225, 266-269, 271, 295, 296, 298). 12-(2, 26, 28, 30, 51-
3 52, 53-55, 87, 98-99, 103, 118, 122, 130,132, 138, 140, 151, 153,). 13-
4 (25, 58, 64, 85, 130-131).
5 Redding: 1-(2, 17, 18, 20). 2-52. 3-(34, 56). 4-(16, 20, 21, 42). 6-(10, 11, 17, 18,
6 26-28). 7-15. 8-(8-10). 9-(10, 16). 10-(2, 18). 11-(2, 3, 44, 47). 12-(27,
7 81, 84, 87-90). 13-(1, 58, 73, 77, 78, 81, 83, 84). 14-(1, 4-6, 8, 9, 17).
8 16-(3, 6, 8, 12, 17). 17-(1, 6, 11, 12, 14-16, 18, 22, 23). 18-(1, 8, 11-15,
9 18, 20, 22). 19-(3, 11, 73, 76). 20-(1, 3, 4-6, 25, 42). 21-(1, 2, 5-10, 12,
10 16, 18, 19, 22, 23, 25, 34). 22-(1-8, 10, 14). 24-(4, 9). 27-2, 6, 7. 28-4.
11 refuges: 1-23. 3-23. 6-(5, 6, 15, 34, 35, 54, 55, 57, 72-81, 91, 93, 99-101,
12 108-110, 116-118, 122, 127-129, 133. 7-24. 9-11. 11-31. 12-88. 13-82.
13 18-19. *see also* game refuges *and* wildlife refuges
14 residential areas: 8-6. 17-13. 19-78. 21-5.
15 Resource Conservation and Recovery Act: 9-11. 21-21.
16 revegetation: 2-33. 4-(65, 73, 80, 85, 90). 7-(80, 128, 172). 11-(86, 92, 93).
17 12-(114, 147, 158, 161, 162, 175, 177, 180, 187).
18 riparian communities: 12-(27, 28, 31, 99-101, 103, 116-119, 122, 123, 130, 132,
19 138, 140, 144, 147, 151, 153). 13-(91, 248). 26-15.
20 riparian scrub: 12-(31, 35, 59, 62-64). 13-25.
21 riparian woodland: 10-18. 11-44. 12-(30, 31, 35, 51, 52, 54, 59, 60, 62-64, 85).
22 13-(25, 58, 60, 62).
23 riprap: 2-(71, 72, 92). 4-(30, 44). 7-(23, 26). 11-(4, 19, 26). 12-(21, 30, 57).
24 13-(19, 74, 131).
25 Rivers and Harbors Act: 1-26. 3-49. 12-73. 26-13.
26 roadways: 2-(29, 34, 35, 39, 44, 47, 55, 62, 64, 70, 73-75). 3-64. 4-(86, 91),
27 5-(41, 43). 8-(7, 9, 15, 28). 9-(1, 24, 27, 28, 32, 35, 38, 41). 11-6. 12-(1,
28 71, 177). 13-(1, 242). 17-(25, 26). 19-(11, 12, 59, 60, 63, 64, 73, 78, 83,
29 84, 86, 88, 90, 92, 95, 98). Chapter 20. 21-1. 26-22.
30 ROD—*see* record of decision
31 roosting: 13-(22, 23, 61-63, 101, 103, 113, 114, 127, 138, 145, 161, 167, 191,
32 193, 221, 227).
33 runoff: 1-(12, 17, 22). 2-(29, 39, 41, 45, 48, 63). 4-(33, 45, 46). 6-(1, 7, 17, 22,
34 24, 43, 45, 134, 135, 137-140). Chapter 7. 9-(7, 11, 26). 10-13. 11-(2, 7,
35 20, 86, 91, 93, 152, 203, 336-338, 340, 341). 12-(31, 70), 13-173. 19-9.
36 21-15. 23-(4, 25-27). 25-(9, 18, 19).
37
38 **S**
39 Sacramento County: 1-23. 3-17. 6-(27-29). 8-20. 10-(12, 22). 11-(38, 44).
40 12-85. 13-78. 16-(3, 5, 7). 17-(7, 16).
41 Sacramento River Conservation Area: 2-(54, 62). 3-(13, 29). 10-(23, 24).
42 11-(45, 47, 330). 12-(86, 87, 101, 105, 119, 123, 164). 13-(79-81, 129).
43 Sacramento River Flood Control Project (SRFCP): 2-22. 6-7.
44 Sacramento River National Wildlife Refuge: 12-88. 13-82. 18-15.
45 safety—*see* public safety

1 salinity: 1-(17, 22). 2-(26, 39). 3-(14, 35, 38, 39). 6-(11, 15, 21, 22, 32, 33).
2 7-(7, 8, 17, 18, 30, 32, 34, 36, 38, 39, 41, 43, 50, 51-58, 64, 65, 67-69,
3 71-79, 90-100, 106, 107, 110, 111, 113-125, 127, 134-144, 150, 151,
4 154, 155, 157-169, 171, 178-188, 194, 195, 198, 199, 201-213, 215,
5 222-224, 232-241, 247, 248, 251, 252, 254-266, 268, 274-277, 286).
6 11-(8, 9, 25, 27, 61, 63, 73, 129, 138, 139, 187, 234, 235, 273, 309, 310,
7 325, 335-337, 339-341). 12-(32, 91, 97). 23-11.
8 salmon: 1-(6-9). 2-(15, 38, 43, 46, 50, 52-54, 56, 57, 60, 62, 87, 88, 95, 97,
9 100). 3-(5, 13, 14, 19, 23, 25, 26, 28, 30-33, 47, 48, 60). 4-43. 6-(14, 20,
10 47). 7-(11-13, 27, 45, 87). 9-11. Chapter 11. 13-(180, 192).14-(3-5).
11 18-(11, 44, 58, 71, 77, 78, 84). 24-4. 25-(14, 16, 19, 20, 40, 41).
12 San Andreas Fault system: 4-(21, 22).
13 San Francisco Bay: 1-(22-24). 3-5. 4-44. 5-6. 6-(19, 31). 7-(7,10, 17, 18, 21,
14 33). 10-(6, 7, 12). 11-(7-10, 31, 44, 61, 63). 12-2. 17-(8, 16). 20-5. 23-8.
15 San Francisco Bay/Sacramento–San Joaquin River Delta (Bay-Delta): 1-(22).
16 3-(24, 27, 34, 40). 6-(21, 24). 7-(30, 31, 36). 11-8. 12-(2, 31). 13-(26,
17 64).
18 San Joaquin County: 6-29. 10-22. 16-(3, 4, 7).
19 Scenic Highway Program: 3-63. 19-(73, 77, 80-82, 84, 86, 88, 90, 92, 93).
20 26-21.
21 schools: 3-55. 18-22. Chapter 22. 24-2. 25-16. 26-8.
22 scoping: 1-(5, 32, 38). 2-(5, 7, 16, 95). 3-(13, 27, 32, 34, 45). 5-(19, 20, 30). 9-8.
23 24-1. 27-(1-4, 7). 28-1
24 scour: 4-(29, 67), 7-9. 11-(58, 62, 63, 118, 119, 124, 132, 136, 174, 176, 222,
25 224, 269, 272, 297, 299). 12-(28, 69, 70, 117, 119, 164). 13-(127, 248).
26 25-(13, 28, 33, 37).
27 Secretary of the Interior: 1-(4, 5, 26). 3-(23, 51). 13-67. 17-(17, 19).
28 Section 10: 3-49. 11-28. 12-73. 13-68. 26-13.
29 Section 401: 1-28. 2-32. 3-(47, 62). 4-(48, 49). 7-(21, 28, 31). 11-30. 12-(73,
30 83). 13-77. 26-(13, 21).
31 Section 402: 1-28. 2-29. 7-21. 11-30. 12-73. 26-13.
32 Section 404: 1-26. 2-32. 3-(46, 47). 7-(21-23, 31, 80, 128, 172). 11-29. 12-(27,
33 73, 96). 13-(73, 74, 77). 26-(11-13, 17).
34 Section 404(b)(1): 3-46. 26-(11-13).
35 Section 7: 3-(5, 48). 11-(28, 33, 42). 12-71-72. 13-(66, 242). 26-(14, 16).
36 sediment transport: 4-(29, 30, 43, 44, 53, 54, 61, 62, 66, 67, 70, 77, 84, 89).
37 7-(9-11, 81, 85, 132, 176, 220, 226, 230). 11-(118, 124, 174, 176, 222,
38 224, 269, 270, 272, 297, 299) 25-19.
39 sedimentation: 2-29. 4-(52, 67, 74, 81, 86, 91, 92). 7-(11, 21, 31, 35, 80, 84,
40 219, 228, 229). 11-(54, 86, 91, 92, 152, 203, 336-339, 341, 13-(96, 98,
41 136, 159, 181, 197). 18-14.
42 seepage: 7-22. 10-2. 21-15.
43 seismic hazards: Chapter 4. 9-19.
44 sensitive plant communities: Chapter 12. 26-3.

- 1 sensitive receptors: 5-(24, 28, 31, 32, 41, 42, 47, 51, 52, 56, 61, 64, 69). 8-(7,
2 11, 22, 23-38). 9-(22, 27, 28, 30, 32, 33, 35, 36, 38, 39, 41-48). 19-(78,
3 83). 20-(33, 34, 38, 41, 44, 47). 26-18.
- 4 Shasta-Trinity National Forest (STNF): 1-(14, 26, 27, 30). 3-(5, 56). 4-(41, 47,
5 48). 7-(3, 24, 25). 8-(35, 39). 9-(2, 13). 11-(19, 38, 39, 80). 12-(73, 74,
6 96). 13-(68, 69, 70). 17-(2, 8, 17). 18-(16, 17, 20). 19-(4, 5, 13, 74, 80,
7 81, 84-89, 91, 93, 94, 96-98). 20-55. 21-(16, 21, 25, 32, 51). 22-9. 25-(3,
8 6, 7, 9, 11, 12, 22, 23, 25, 30, 34, 38, 40). 26-(15, 16).
- 9 SHPO—*See* State Historic Preservation Officer
- 10 Sierra Nevada: 4-(13,-15, 20, 31). 5-3. 6-2. 7-28. 10-6. 12-(35, 37). 13-(5, 57,
11 61). 17-7. 23-(6).
- 12 significance criteria: 3-6. 4-(56, 101). 5-(27, 28, 30). 6-(34, 89, 95, 99, 103, 108,
13 112, 116, 120, 123, 127, 134). 7-(40, 285). 8-22. 9-20. 10-25. 11-(71,
14 334). 12-(84, 95-97,). 13-(86-88). 14-18. 16-17. 17-23. 18-(25, 26).
15 19-(77-79). 21-25. 22-12. 23-(10, 24, 57). 25-24.
- 16 siltation: 6-36. 7-21.
- 17 siphons: 3-18. 6-36.
- 18 SLC—*see* State Lands Commission
- 19 sloughs: 3-(35, 46). 6-(3, 4, 7, 8, 13, 16, 17, 37, 42). 11-(6, 7, 9, 33, 65, 120).
20 12-(30, 122). 13-(25, 62-64). 17-19.
- 21 snowfall: 5-15. 18-2. *see also* precipitation
- 22 snowpack: 1-12. 18-96.
- 23 socioeconomics: 1-38. 3-46. Chapter 16.
- 24 Soil Conservation Service—*see* Natural Resources Conservation Service
- 25 soil disturbance: 7-45. 12-114.
- 26 soil surveys: 4-45.
- 27 soils: 2-29. 3-(1, 20). Chapter 4. 7-(1, 2, 7, 33). 10-(1, 20). 11-91. 12-(29, 53,
28 57, 58, 69, 70, 71, 117, 164). 13-63. 19-(11, 64, 71, 83, 85-90, 92, 100).
29 21-33. 25-(26, 27, 32, 36, 37). 26-(1, 4).
- 30 solid waste: Chapter 21.
- 31 special-status species: 1-(34, 35). 2-68. 3-32. 10-(27, 28). Chapter 11. Chapter
32 12. Chapter 13. 17-(11, 18). 25-21. 27-6.
- 33 species of special concern: Chapter 13.
- 34 spill prevention and control plan: 2-30.
- 35 spring-run Chinook salmon: 1-(6, 8, 9). 3-(25, 26, 30, 32). 6-(13, 14). 7-25.
36 11-(3, 5, 10, 15, 28, 34, 55, 56, 78, 99-103, 162-165, 210-213, 256-259,
37 286-289).
- 38 Squaw Creek: 2-57. 4-(1, 24, 26, 49, 60, 66, 72). 6-2. 7-(3, 4, 8, 14, 15, 46, 49,
39 84, 90, 131, 175). 9-1. 11-(17, 18, 20, 53, 88, 156, 205, 206, 251). 12-(6,
40 7,8, 25, 36, 28, 66-69, 71, 110-114, 127-129, 136). 13-(6, 20, 28, 29, 30,
41 95, 97, 99, 101, 102, 104, 107, 109, 110, 112, 115-120, 135-137,
42 139-141, 143, 144, 146-149, 158, 159, 161, 162, 164-166, 168-171).
43 14-(2, 3). 17-1. 18-(38, 53, 66). 19-(71). 20-(2, 36, 39). 26-6.
- 44 SRFCP— *see* Sacramento River Flood Control Project
- 45 staging areas—2-(90, 91). 5-67. 7-283. 8-37. 9-(25, 45). 11-91. 13-(65, 244).
46 17-(26, 36). 18-8.

1 stakeholders: 1-(24, 25, 32). 2-12. 3-23. 11-(35-37). 12-(78, 89, 157, 163, 168,
2 171, 174, 179). 13-83. 19-80. 25-3. 27-(1, 2, 4-7). 28-9.
3 State Historic Preservation Officer (SHPO): 14-(8, 11, 13-15). 26-16.
4 State Lands Commission (SLC): 1-27. 3-63. 17-19. 18-(13, 14). 26-21. 28-3.
5 State Parks—*see* California Department of Parks and Recreation
6 State Route 151 (SR 151): 19-(6, 12, 13, 57, 58, 60, 73, 81, 82, 84-88, 90-92).
7 26-21.
8 State Route 273 (SR 273): 17-6. 20-1.
9 State Route 299 (SR 299): 19-73. 20-2.
10 State Route 36 (SR 36): 20-3.
11 State Water Resources Control Board (SWRCB): 1-(8, 17, 28, 33, 35). 2-(40).
12 3-(18, 19, 47, 60). 4-48. 5-20. 6-(19-25, 33, 37, 38). 7-(4, 18, 20, 21, 28,
13 31-35, 39, 43, 50, 53, 56, 59, 62, 66, 70). 9-8. 11-(8, 30, 32, 36, 37, 50,
14 175, 223, 271). 12-69. 13-77. 23-5. 21-(23, 26). 28-3.
15 State-owned: 3-68. 20-6. 22-8.
16 steelhead: 1-8. 2-40. 3-(5, 13, 25, 26, 30-33). 6-(14). 7-(27Chapter 11. 18-(11,
17 77). 25-(14, 20).
18 storage facilities: 1-(23, 24). 6-1. 9-9. 11-63. 23-1.
19 stormwater permit: 2-53. 7-278. 21-21.
20 stormwater pollution prevention plan (SWPPP): 2-(29, 30, 74). 7-(22, 32, 219,
21 229, 270, 271, 278). 11-(92, 93, 336-340).
22 streambed alteration agreement: 1-24. 2-32. 4-48. 11-37. 12-(83, 175,176).
23 13-77. 26-19.
24 study area—*see* primary study area *and* extended study area
25 Superfund—*see* Comprehensive Environmental Response, Compensation, and
26 Liability Act
27 suspended load: 4-44. 7-10.
28 Sutter County: 3-(32, 42). 5-1. 6-27. 7-33. 8-20. 10-3. 11-(6, 44). 12-(85).
29 13-(78). 16-7. 17-(7, 16).
30 swimming: 7-(8, 20, 26). 9-14. 18-(1, 6, 12-15, 42-44, 46, 47, 57, 59, 70-72, 76,
31 77, 80, 83, 84, 86). 19-4.
32 SWPPP—*see* storm water pollution prevention plan
33 SWRCB—State Water Resources Control Board
34
35 **T**
36 TCD—*see* temperature control device
37 TDS—*see* total dissolved solids
38 Tehama County: 1-(20, 28). 3-(30, 32, 45, 56, 65). 4-(28, 33). 5-(1, 25, 29).
39 7-33. 8-(13, 18, 19-21, 38). 9-(5, 20, 44, 45). 10-(1-3, 11, 23-25). 11-
40 (44, 46). 12-(76, 78). 13-(73-75). 14-(1, 2, 4). 16-(1-3, 6-8, 10, 12-18,
41 23, 24). 17-(1, 6, 14, 21, 23). 18-(13, 14, 18, 21, 22). 20-(1, 3, 7). 21-(1,
42 10, 12, 15, 17, 18, 25, 35). 22-(1, 4-8, 11). 24-(3, 5, 12, 17, 20, 23, 25,
43 28). 26-(7, 22).
44 telecommunications: 2-(84, 86). Chapter 21.
45 telephone service: 21-19.

- 1 temperature: 1-(4, 8, 9, 14, 20). 2-(8, 14, 17, 21, 24, 28, 35, 37-39, 41-44, 46-49,
2 54, 56, 60, 63, 70, 71, 94, 96-98, 100). 3-(13, 20, 23, 25, 28, 31, 38).
3 4-(33, 83). 5-(3, 7-9, 68). 6-(14, 16, 18, 20, 40-43, 47, 120). 7-(19, 26,
4 29, 30, 37, 42-48, 50-52, 54, 89-91, 116-118, 120-122, 147-149,
5 151-154, 157-161, 165-169, 180-184). 8-3. 9-(2, 4, 5, 48). 10-23. 11-(2,
6 3, 5, 7, 8, 16-18, 25, 33, 37, 47-50, 54, 56, 58-60, 68, 71, 72, 78, 79,
7 91-93, 97-99, 102, 103, 107, 108, 112-118, 120, 122, 123, 125, 148,
8 159, 162, 165, 167, 170-176, 192, 193, 208, 210, 213, 215, 218-224,
9 243, 253, 256, 259, 262, 265-271, 275, 283, 286, 289, 291, 294-298,
10 315, 323, 324, 334, 335). 12-(72, 87, 108, 125, 142, 149). 13-(81, 180,
11 249). 18-(2, 11, 42, 44, 57, 58, 70, 71, 77, 84, 89). 23-(14, 16, 19, 22).
12 25-(11, 15-19, 23, 27, 28, 31, 33, 35, 37).
- 13 temperature control device (TCD): 1-(8, 9). 2-(14, 21, 24, 35, 37, 42, 46, 49, 58,
14 69, 71, 96, 97). 4-83. 5-(35, 46, 50, 55, 60). 6-(15, 20, 40, 41, 47, 95,
15 103, 112, 120, 122). 7-(11, 12, 14, 37, 42, 44, 45, 49, 85, 116, 147).
16 11-(17, 50, 55, 79, 115, 148, 171, 197, 219, 243, 247, 269, 275).
17 12-(107, 125, 134, 142, 149). 13-180. 21-34. 23-(13, 15, 17, 19, 21).
- 18 threatened species—*see* special-status species
- 19 timberlands—*see* logging
- 20 timber: 2-68. 3-(22, 53, 56). 4-(28, 29, 47). 7-2. 9-13. 10-(13, 23). 12-74. 13-69.
21 17-(2, 6, 8-10, 13). 18-(21, 38, 39, 56, 69, 75, 82, 88, 92-96). 19-74.
22 21-22. 25-18.
- 23 TMDL—*see* total maximum daily load
- 24 topography: 2-(6, 30, 76). 4-(2, 17, 19, 23, 31, 43, 51, 55). 8-(8, 25, 26). 9-(2,
25 4). 12-(29, 30, 145). 17-1. 19-(6, 7, 10, 12, 58-62, 65, 66, 68-72). 22-1.
- 26 total dissolved solids (TDS): 6-12. 7-(7, 17).
- 27 total maximum daily load (TMDL): 7-(6, 13, 19, 21, 23, 28, 44, 53).
- 28 toxic substances: 5-14. 9-27.
- 29 traffic: 2-(71, 74, 76-78). 3-(2, 45). 5-(21, 26, 65-67). 6-17. 7-25. 8-(3, 5-9, 14,
30 15, 17, 22-25, 27-35, 38). 9-(24, 27, 28, 32, 35, 36, 38, 39, 41, 44).
31 10-12. 12-(114, 115, 147). 13-(96, 98). 16-10. 17-(22, 25-27). 18-(2, 28,
32 48, 60, 74, 81). 19-(11, 58, 69, 71, 94, 95, 99). Chapter 20. 21-(30, 33,
33 51). 22-(6, 7, 13-15, 17, 27, 28). 26-6.
- 34 traffic control plan: 20-(51, 52).
- 35 trails: 2-(36, 60, 62, 79, 82). 9-14. 13-244. 14-(1, 5, 21, 24, 25, 27, 29). 17-7.
36 18-(5, 6, 8, 12-16, 18, 22, 23, 30-34, 51, 53, 54, 63-66). 21-45.
- 37 transportation: 1-(27, 38). 2-(26, 27, 32, 68). 3-(2, 31, 41, 44, 64). 4-50. 5-(3,
38 10, 14, 17, 20, 66). 7-151. 8-(7-9, 11, 12, 14-18, 20, 21, 29). 9-(4, 8, 9,
39 18, 19, 24, 30, 34, 37, 40, 44, 45). 10-1. 11-20. 14-(4, 5). 16-(3, 12).
40 17-(6, 22, 26). 18-32. Chapter 20. 21-(24, 30, 37, 41, 42, 45). 22-(13, 18,
41 20, 22-25). 24-11. 26-(4, 8).
- 42 trash—*see* waste disposal, solid waste
- 43 tribes: 1-34. 3-(50, 54). 7-(19, 20). 12-(72, 73). 14-(1, 3, 9, 10, 13, 14, 17).
44 15-(1, 3, 4). 16-9. 24-(4, 9, 11, 15, 16). 25-6. 26-(17, 18). 27-(1, 3, 6).
- 45 Trinity Reservoir: 1-20. 6-49. 23-2.

Shasta Lake Water Resources Investigation
Environmental Impact Statement

1 trucks: 2-(30, 74, 86, 91). 5-(4, 33, 66). 7-177. 8-(13, 21, 25). 9-(32, 33, 36, 39).
2 18-78. 20-(26, 29, 30, 34, 35, 38, 42, 43, 45, 47). 21-50.
3 trustee agency: 1-27.
4 turbidity: 7-(1, 2, 4, 6, 7, 8, 10, 23, 28, 42, 45, 46, 49, 151, 157-159). 11-(54, 63,
5 64, 86, 91, 92, 152, 158, 203, 207, 252, 282). 12-32. 25-(18, 19, 23, 27,
6 33, 37).
7
8 **U**
9 U.S. Army Corps of Engineers (USACE): 1-(1, 26). 2-32. 3-(33, 40-43, 46, 47,
10 49). 4-55. 6-(17, 18, 23). 7-(20-22, 29). 11-(29, 70). 12-(65, 73, 92, 121,
11 145, 146, 161, 162). 13-(73, 133). 18-21. 23-2. 26-(11-13, 16, 17). 27-5.
12 U.S. Bureau of Land Management (BLM): 1-26. 2-6. 3-(29, 52, 55, 56). 4-47.
13 7-25. 9-16. 10-24. 11-40. 12-(33-35, 58, 75-77, 81, 90, 98, 108, 110,
14 135, 143, 150, 156, 162, 168, 170, 173, 179, 182). 13-(26-31, 58, 59, 61,
15 70, 71, 73, 84, 94, 96, 100, 107, 111, 112, 134, 135, 138, 142-145, 157,
16 158, 160, 164, 166, 167, 180, 181, 183, 196, 197, 199, 200, 226). 16-9.
17 17-(6, 8, 11, 12, 14, 17, 18). 18-(8, 11-15, 18, 20, 21, 43, 79). 19-(58,
18 59, 76). 21-(22, 23). 22-(2, 3, 5-8, 10). 25-1. 26-(1, 15, 16). 27-5.
19 U.S. Census Bureau: 16-14. 24-(8, 9).
20 U.S. Department of Agriculture (USDA): 10-19. 12-(57, 58). 13-75.
21 U.S. Environmental Protection Agency (EPA): 1-27. 3-(46, 47, 49, 50, 55).
22 5-(7, 10-14, 19, 25, 27). 6-(11, 30, 33, 34). 7-(6, 15, 17-19, 24, 31).
23 8-(12, 25, 27). 9-(10, 12, 18, 29). 11-36. 12-(72, 89). 13-(79, 83).
24 21-(20, 21, 34). 24-(7-8). 26-(11, 13). 27-7.
25 U.S. Fish and Wildlife Service (USFWS): 1-(1, 2, 13, 26, 34, 36). 2-(6, 18, 20,
26 31, 40, 50, 56, 98). 3-(4, 5, 6, 24, 26, 47, 48). 6-(15, 37). 7-(11, 25, 26).
27 11-(10-15, 21, 27-29, 31, 33-38, 41, 45, 48, 54-55, 65, 70, 71, 144, 147,
28 193, 196, 240, 243, 274, 315, 318, 326-328, 330, 331, 333). 12-(2, 33,
29 51-55, 71, 72, 75, 86, 88, 90, 92, 95, 121, 161, 162, 164, 166, 169, 172).
30 13-(2, 27, 28, 56-58, 65-67, 73, 75, 79, 82, 84, 87, 122, 131, 133, 150,
31 157, 172, 179, 185, 195, 202, 208, 220-222, 226, 241, 242). 18-15.
32 21-10. 22-3. 26-(14, 15). 27-5.
33 U.S. Forest Service (USFS): 1-(1, 3, 14, 16, 20, 26-31). 2-(6, 25, 36, 79, 81, 82,
34 84). 3-(52, 56). 4-(23, 41, 47, 53). 7-(24, 27). 9-(2, 5, 7, 13, 21, 23, 44,
35 45). 11-(10-15, 37, 38, 40, 76, 88, 156, 205, 251, 281). 12-(1, 32-34, 37,
36 51-55, 58, 68, 73, 75-78, 79-81, 98, 108, 109-110, 126, 135, 143, 150,
37 156, 161-162, 163, 168, 170, 173, 179, 182). 13-(1, 26-32, 58-61, 68,
38 70-72, 94, 96-97, 100, 102, 105, 107, 111-112, 117, 134-136, 138-140,
39 142-146, 157-161, 163-164, 166-168, 180-184, 196-200, 217-222, 225-
40 226, 228, 243). 14-(2, 5, 13, 14). 16-(9, 14). 17-(5, 6, 8, 11, 12, 17, 18,
41 26-29, 31, 32, 37). 18-(1, 2, 5, 6, 13, 16, 17, 25, 27, 30-34, 38, 51-54,
42 63-67, 92). 19-(4, 5, 61, 63-68, 70, 72, 74, 77, 78, 80, 81). 20-(1, 2, 30,
43 31, 35, 36, 39). 21-(10, 19, 32, 51). 22-(3-10, 15, 16). 25-(3, 4, 6-8, 11-
44 13, 17, 19-24, 29, 30, 33, 38). 26-(1, 15, 16). 27-5. 28-2.
45 U.S. Geological Survey (USGS): 4-(29, 33, 46). 7-(6, 9, 11, 15, 16). 11-54.
46 13-58. 25-(11, 21, 23).

- 1 UBC—*see* Uniform Building Code
2 unemployment: 16-(1, 2, 4, 5, 15, 23-25, 35, 43, 51, 57). 24-(5, 6, 11-14).
3 Uniform Building Code (UBC): 4-(21, 34, 51, 56). 8-16.
4 Union Pacific Railroad (UPRR): 2-(45, 77-79, 96). 8-(8, 10). 9-(8, 9). 17-(2, 6,
5 27). 19-(4, 62, 63, 65, 71). 20-(2, 4, 5). 21-34.
6 Unique Farmland: 3-51. 10-(7, 11, 20-22, 25, 42). 26-15.
7 unity: 19-(2, 3).
8 uplands: 4-(13, 41, 61). 11-11. 12-(70, 71, 92). 13-(99, 104, 137, 160). 19-(11,
9 60, 61, 64, 66-68).
10 USACE—*see* U.S. Army Corps of Engineers
11 USDA—*see* U.S. Department of Agriculture
12 USFS—*see* U.S. Forest Service
13 USFWS: *see* U.S. Fish and Wildlife Service
14 USGS—*see* U.S. Geological Survey
15 utilities: 2-(25, 26, 36, 39, 44, 47, 55, 62, 64, 73, 81, 82, 84-86). 3-(2, 37, 41,
16 43). 5-(4, 18, 25, 33, 35, 43, 46, 50, 54, 59). 8-(13, 18). 9-(23, 30, 33).
17 12-(1, 114). 13-(1, 134, 157, 180). 14-(1, 21, 24, 25, 27, 29). 17-(25-34,
18 37). 19-(9, 82, 85, 87, 89, 91). 20-7. Chapter 21. 22-(1, 13, 18, 20, 23,
19 25). 24-(6, 11).
20
21 **V**
22 valley elderberry longhorn beetle (VELB): 13-(58, 62, 64, 190-193, 241, 242,
23 244).
24 valley oak riparian woodland: 10-18. 12-31.
25 vegetation: 2-(10, 29, 30, 33, 39, 44, 47, 52, 53, 55, 59, 61, 62, 64, 65, 67, 87,
26 88, 89). 3-(22, 34, 41, 47, 58, 59). 4-(27, 29, 30, 55, 60, 62, 65, 72, 73,
27 79, 80, 85, 87, 90, 92). 5-(9, 27, 33, 43, 45, 48, 52, 57, 62). 7-(8, 80,
28 128, 172, 219, 229, 283). 8-(25-27). 9-(2, 4-6, 16, 23, 24, 30, 34).
29 10-(13, 17, 18, 20, 24). 11-(2, 4, 7, 18-20, 24, 41, 47, 48, 51, 52, 80, 81,
30 83, 120, 125, 149, 197, 244, 334, 335). Chapter 12. 13-(2, 5, 19-27, 32,
31 61-64, 72, 74, 76-78, 81, 82, 85, 90-92, 94-109, 110-114, 117, 119,
32 121-123, 126, 127, 129, 130, 134-145, 147-151, 155, 157-164, 166-172,
33 177, 180-185, 190-194, 197-202, 205, 206, 214, 217-230, 243, 244,
34 247-252. 17-(2, 11, 18, 19, 29). 18-(14, 38, 39, 56, 69, 75, 78, 82).
35 19-(1-3, 5-7, 10-12, 58-61, 63, 65-71, 77, 81, 82, 85, 86-91). 20-9.
36 21-(28, 30-32, 37, 40, 42, 45). 22-14. 25-(3, 9, 11, 12, 15, 18, 27, 28, 30,
37 37, 38). 26-(1, 11).
38 vehicle trips: 3-21. 5-(39, 40, 43, 47, 48, 51, 52, 56, 58, 61, 62). 8-22. 20-56.
39 VELB—*see* valley elderberry longhorn beetle
40 vibration: 3-(1, 55). Chapter 8. 26-(18, 22).
41 views: 18-6. Chapter 19. 26-2.
42 visibility: 4-43. 5-7. 19-2.
43 visual and aesthetic resources: Chapter 19.
44 vividness: 19-(2, 3).
45 VOC—*see* volatile organic compounds
46 volatile organic compounds (VOC): 5-(3, 23, 24)

1
2 **W**
3 **WAPA**—*see* Western Area Power Administration
4 waste discharge requirements (WDR): 3-62. 7-(26, 29). 9-11. 21-(23, 26).
5 26-21.
6 waste disposal: 4-66. 9-(7, 12, 16, 29, 31, 33, 35, 36, 39). Chapter 21.
7 wastewater: 2-(25, 36, 83-85). 4-(34, 52, 56, 58, 66, 73, 80, 85, 90, 91, 95,
8 102-105). 7-(3, 7, 8, 19, 44). 9-(7, 23). Chapter 21.
9 wastewater treatment plants: 2-86. 9-7. Chapter 21.
10 water exports: 11-145.
11 water level: 1-34. 2-(36, 37, 59, 64, 69, 78). 4-53. Chapter 6. 7-31. 9-8. 11-(18,
12 19, 21, 24, 83). 12-29. 14-11. 17-(5, 24). 18-(7, 25, 26). 19-(4, 10, 11,
13 57, 66-68, 71, 83). 24-4. 25-(11, 18, 19, 21, 22, 24, 25, 27-31, 33-35,
14 37-39). 26-2. 27-7.
15 water quality: 1-(4, 6, 9, 12, 14, 16, 17, 23, 28, 34, 36, 37). 2-(5, 11, 14, 22, 23,
16 24, 26, 28, 29, 32, 38-41, 44, 47, 55, 62, 63, 100). 3-(1, 13, 20, 26-28,
17 30, 33, 35, 36, 38, 39, 41, 45, 47, 61, 62). 4-(28, 45, 46, 48). 6-(5, 10-12,
18 18-26, 33, 34, 36-38, 42, 43, 61, 64, 67, 94, 103, 112, 120, 122, 131,
19 133-140). Chapter 7. 9-(9-11, 18, 21, 26). 10-(4, 18, 27, 28). 11-(2, 5,
20 17, 30, 32-36, 77, 86, 92, 93, 125, 158, 207, 252, 282, 322, 335, 336,
21 338-341). 12-(72, 73, 83, 89). 13-(77, 83). 17-(7, 10, 11, 18-20, 26).
22 18-96. 21-(6, 23, 30-33, 37, 40, 42, 45). 23-(25-27). 25-(4, 12, 18, 22,
23 23, 25-27, 32, 33, 36, 37). 26-(13, 21).
24 water quality control plan (WQCP): 2-40. 6-(19-21, 24). 7-(3, 6, 32, 33, 34, 40,
25 43). 11-(32, 33). 17-(19, 20). 21-23.
26 water quality standards: 3-(26, 45, 47, 61). 6-(21, 24). Chapter 7. 11-(30, 32,
27 34). 12-(72, 73, 83). 13-77. 26-13.
28 water table: 12-(116, 119). 16-31.
29 water transfers: 1-(4, 22, 36). 2-9. 6-(23, 35). 11-30.
30 waterfowl: 12-56. 13-25. 18-(12, 19). 26-4.
31 water-skiing: 19-4. 20-5.
32 **WDR**—*see* waste discharge requirements
33 weirs: 6-(3, 6-8, 36, 59). 11-6.
34 wells: 2-86. 6-(13, 25). 7-19. 10-(2, 4). 21-(5, 6, 8-11, 20, 21). 22-(19, 21).
35 **Western Area Power Administration (WAPA)**: 11-38. 16-(19, 21). 21-(18, 19).
36 23-6.
37 wet year: 3-32. 4-(97-101). 6-69. 11-(6, 61, 68, 114, 147, 287). 12-(31, 115).
38 16-(33, 41, 49, 62). 18-41-43. 25-(18, 25, 30-32, 34, 36, 38, 39).
39 wetland communities: 11-(323, 324, 328, 329, 331-334). 12-(28, 31, 32, 99,
40 103, 106, 115, 116, 119, 121-124, 130, 131, 133, 138, 140, 141, 144,
41 147, 148, 151, 153, 154, 157-159, 164-167, 169, 171, 172, 174, 175,
42 178, 180). 13-(62-64, 213-215, 231, 250-252). 26-17.
43 **Whiskeytown-Shasta-Trinity National Recreation Area**: 1-(2, 4, 26, 27). 2-25.
44 3-56. 9-(1, 14). 12-77. 13-72. 17-(2, 10, 18). 18-(2, 3, 5, 16, 17). 19-(4,
45 5, 12, 74, 75, 81). 20-1. 21-(1, 22). 22-16. 26-16. 27-6.

- 1 wild and scenic rivers: 1-(32, 38). 3-(2, 53, 56, 60, 61). 17-(6, 7, 18, 20).
2 Chapter 25. 26-(2, 16, 20).
3 wildlife: 1-(2, 4, 5, 14-16, 23, 34, 36, 38). 2-(10, 23). 3-(2, 23, 29, 41, 45, 47,
4 48, 50, 53, 58-60). 6-(6, 15, 20, 22, 24). 7-(13, 24, 43). 9-11. 10-(1, 3,
5 12, 13). 11-(5, 23, 25, 26, 28-30, 39-42, 47). 12-(33, 57, 71, 74, 77, 83,
6 85, 88, 181). Chapter 13. 17-(6, 18, 20). 18-(8, 12, 13, 15, 19). 19-(1, 2,
7 74). 21-(22, 33, 37, 40, 42, 45). 24-17. 25-(6, 7). 26-16.
8 wildlife habitat: 1-34. 2-10. 7-29. 10-3. 11-(39, 44). 12-(61, 84, 90). Chapter 13.
9 17-(2, 10, 11, 14, 18). 18-(19, 21, 96). 26-(2, 14).
10 wildlife refuges: 1-23. 6-(6, 15, 54, 72). 7-24. 9-11. 11-31. 12-88. 13-82.
11 18-(15, 19). *see also* refuges *and* game refuges
12 wildlife viewing: 11-40. 13-70. 18-(11, 15).
13 Williamson Act: 3-62. 10-(1, 13, 15, 21, 22, 24-29, 31-46, 48, 49, 51, 52).
14 26-21.
15 willow scrub: 12-(27, 31, 117).
16 winter-run Chinook salmon: 1-(6, 8, 9). 2-(52, 53, 88, 95, 97). 3-(25, 26, 31,
17 32). 6-(14, 18, 20, 47). 7-(12, 13, 27, 45, 87). 9-11. 11-(3, 10, 15, 21, 28,
18 29, 33, 34, 37, 55, 56, 71, 78, 93-99, 144, 159-162, 208-210, 253-256,
19 283-286, 335).
20 WQCP—*see* water quality control plan
21
22 **X**
23 X2: 6-(15, 22, 34, 37, 38, 91, 98, 107, 115, 121, 126, 132, 135-137, 139, 140).
24 7-(33, 36, 43, 49, 78, 79, 90, 126-127, 170, 171, 214, 215, 224, 267,
25 268, 277). 11-(8, 63, 64, 69, 138-141, 187-190, 234-237, 273, 309-312,
26 325, 335-341). 26-2.
27
28 **Y**
29 Yolo County: 3-(32, 33). 5-1. 6-(27, 28). 7-35. 8-20. 10-(3, 22). 11-44. 12-85.
30 13-(78, 131). 16-(4, 7). 17-(7, 16). 20-5. 24-(5, 12, 13).
31
32 **Z**
33 zoning: 3-(65). 4-(15, 23, 49, 56). 8-(19, 21). 10-25. 17-(11-13, 16, 20, 23, 24,
34 28, 29, 31, 32, 37, 39). 21-(23, 32). 26-22.
35

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