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Lead Agencies:

U.S. Fish and Wildlife Service
U.S. Bureau of Reclamation
Hoopa Valley Tribe
Trinity County

PUBLIC DRAFT

Trinity River Mainstem Fishery Restoration

Environmental Impact Statement/ Report

Executive Summary

October 1999

Draft Environmental Impact Statement/Environmental Impact Report

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Introduction

The Trinity River, located in northwest California, has historically been a major producer of fish and wildlife resources. Of special importance to humans has been the abundant chinook and coho salmon and steelhead. For thousands of years, members of the Hoopa, Yurok, and other tribes depended on the rich and bountiful Trinity River fishery. The first non-Indians to the region also used the fishery. Historic records of fish abundance are problematic; however, one estimate suggested that 168,000 chinook salmon migrated into the Klamath / Trinity River watershed as recently as the mid-twentieth century (half of which may have entered the Trinity River).

In 1955, Congress authorized the construction of Lewiston and Trinity Dams on the Trinity River, and associated structures to export water into the Central Valley of California. From 1965-97 approximately 74 percent of Trinity's water above Lewiston was exported. The dramatically reduced instream flows resulted in substantial detrimental changes to the river, with associated declines in anadromous fish production.

In 1981, the Secretary of the Interior (Secretary) directed the U.S. Fish and Wildlife Service (Service) to conduct a study of the effectiveness of increased flows in restoring salmon and steelhead populations. The Central Valley Project Improvement Act (CVPIA) of 1992 (Public Law 102-575) directed the Secretary to complete the study and—provided the Hoopa Valley Tribe concur—implement accordingly. In 1994, an Environmental Impact Statement / Report was initiated to evaluate a range of alternatives to restore the natural production of anadromous fish on the mainstem Trinity River.

This Executive Summary presents an overview of the Trinity River Mainstem Fishery Restoration Draft Environmental Impact Statement / Environmental Impact Report (DEIS / EIR).

Purpose and Need for the Action

The purpose of the proposed action is to restore and maintain the natural production of anadromous fish on the Trinity River mainstem downstream of Lewiston Dam. The need for this action results from Congress:

(1) mandate that diversions of water from the Trinity River to the Central Valley Project not be detrimental to Trinity River fish and wildlife resources; (2) finding that construction and operation of the Trinity River Diversion (TRD), as well as other factors, have contributed to detrimental effects to habitat and have resulted in drastic reductions in anadromous fish populations; (3) finding that restoration of depleted stocks of naturally produced anadromous fish is critical to the dependent tribal, commercial, and sport fisheries; and (4) confirmation of the federal trust responsibility to protect tribal fishery resources affected by the TRD.

For purposes of the DEIS/EIR "restore" is defined as reviving the well-being, vitality, and use thereof. The Trinity River DEIS/EIR does not establish specific salmon population targets due to the complexity, uncertainty, and confounding factors in identifying and monitoring such targets. Instead, the DEIS/EIR is premised on a "healthy river" concept. The DEIS/EIR assumes that restoration of pre-dam attributes—such as alternate bar sequences, effective sediment transport, and dynamic riparian communities—will result in the restoration of anadromous fish production.

The purpose and need for the proposed action is supported by legislative, executive, and judicial authorities and decisions. Among the more prominent is the Trinity River Act of 1955 (P.L. 84-386), which stated that water diversions from the Trinity should not be detrimental to the river and that the Secretary "adopt appropriate measures to insure the preservation and propagation of fish and wildlife" in the Trinity River Basin. In January 1981, the Secretary signed a Secretarial Decision directing the Service to conduct a 12-year Trinity River Flow Evaluation Study (TRFE) summarizing the effectiveness of flow restoration to restore the fishery. The Secretary's action was based in part on tribal trust responsibilities. In 1984, the Trinity River Basin Fish and Wildlife Management Restoration Project Act (P.L. 98-541) authorized programs "to restore natural fish and wildlife populations to levels approximating those which existed immediately prior to the construction of the Trinity Division." In October 1992, the CVPIA was enacted by Congress. It directed the Secretary to develop recommendations for permanent instream flow requirements, TRD operating criteria, and procedures for restoring and maintaining the Trinity River fishery. The act acknowledged the federal government's trust responsibility to the Hoopa Valley Tribe by requiring tribal involvement in the TRFE and by increasing the interim instream releases (to 340,000 acre-feet/year [af/yr]) to restore the fishery. In 1996, amendments to the 1984 Trinity River Basin Fish and Wildlife Management Act (P.L. 104-143) clarified that "restoration is to be measured not only by returning adult anadromous fish spawners, but by the ability of dependent tribal, commercial, and sport fisheries to participate fully ... in the benefits of restoration."

Tribal Trust

The Hoopa Valley, Karuk, Klamath, and Yurok Tribes are officially recognized by the federal government, with the Hoopa Valley and Yurok Tribes being most strongly associated with the Trinity River. Tribal issues are prominent in the DEIS/EIR.

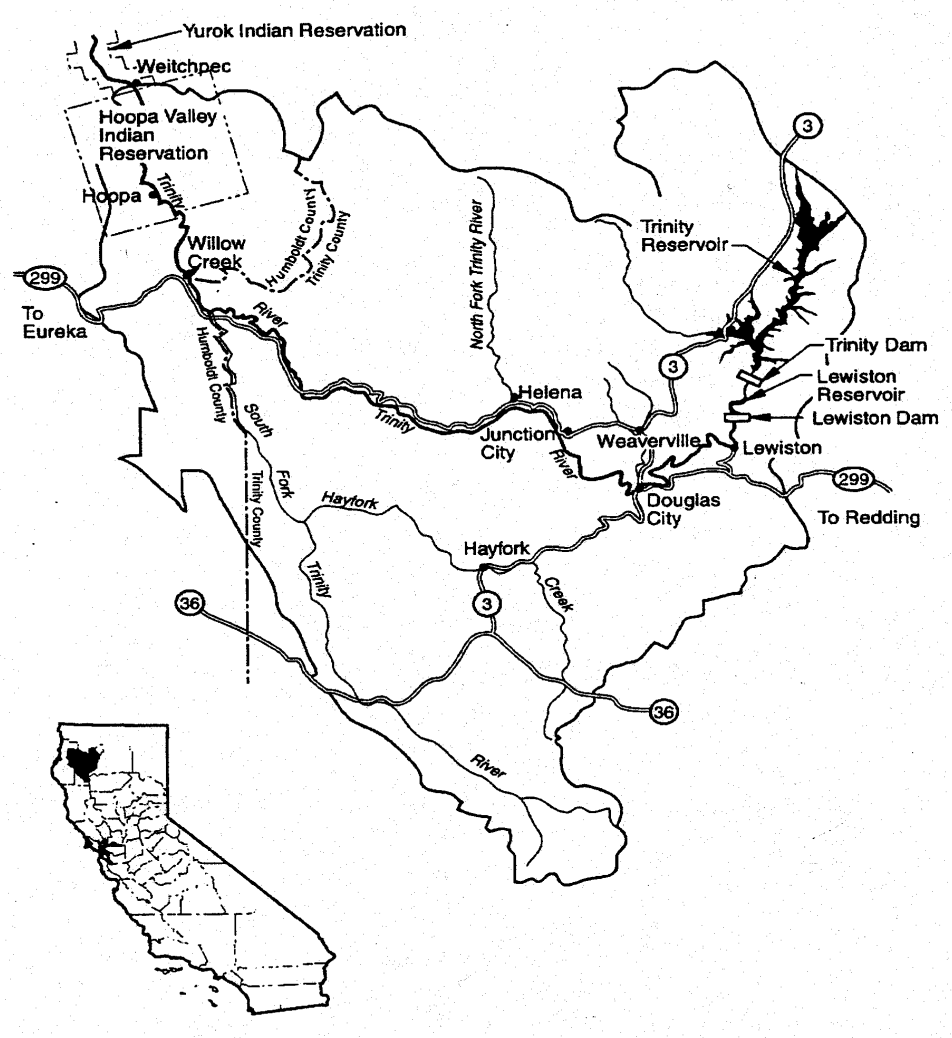
The Hoopa Valley Indian Reservation was established in 1864. The reservation generally consists of a 12-mile-square block of land bisected by the lower Trinity River. In 1988, Congress, via the Hupa-Yurok Settlement Act, established the Yurok Indian Reservation, which is bisected by the lower Klamath River. Several court rulings have established that an important "Indian purpose" for the reservations was to reserve the tribes' rights to take fish from the Klamath and Trinity Rivers.

Central Valley Project and Trinity River Division

The TRD is one of nine divisions of the Central Valley Project (CVP). The TRD consists of Trinity and Lewiston dams and reservoirs, as well as associated powerplants, tunnels, dams, reservoirs, and other features. The TRD is operated and maintained by the U.S. Bureau of Reclamation (Reclamation). The primary purpose for the TRD was to increase the

supply of water for irrigation and other beneficial uses in the Central Valley of California. Congress stated that "surplus" water could be exported without detrimental effects to Trinity River fish and wildlife. From 1965-97 an average of 988,000 acre-feet (af) was exported annually from the Trinity River into the Central Valley (range 218,000-1,799,000), representing about 74 percent of the inflow above Trinity Dam.

Exported Trinity River water is used for irrigation, municipal and industrial uses (M&I), hydropower, and fish and wildlife purposes in the Central Valley and Bay-Delta. The CVP supplies irrigation water to approximately 200 water districts, individuals, and companies through annual contracts for 4.5 million acre-feet (maf) of water. M&I water is supplied to 40 districts and utilities through contracts for 0.5 maf. The CVP includes 20 reservoirs, with combined storage capacity of 11 maf; 9 powerplants and 2 pumping-generating plants with a maximum capacity of 2 million kilowatts (kW); and approximately 500 miles of major canals and aqueducts.



NEPA and CEQA

The DEIS/EIR is intended to comply with both the federal National Environmental Policy Act (NEPA) and the California Environmental Quality Act (CEQA). By preparing a single document that complies with both statutes, the involved agencies have avoided duplication of effort. The statutes are similar in that they require federal and state agencies to consider a range of alternatives to meet the project purpose, to evaluate the impacts of the alternatives, and to disclose the alternatives and impacts to the public prior to making a commitment of resources. The statutes differ in several ways, two of the more substantive being:

- CEQA requires state agencies to implement feasible mitigation whereas NEPA requires only that federal agencies consider mitigation
- CEQA requires that proposed actions be compared to existing conditions whereas NEPA requires only that they be compared to future conditions without the project.

Description of Alternatives

Alternatives were developed to provide a reasonable range of actions that satisfied the purpose and need (per NEPA), and goals and objectives (per CEQA), and were feasible. Alternatives were selected based on public input, scientific information, and professional judgement.

Preferred Alternative

The Flow Evaluation Alternative, coupled with additional watershed protection efforts (described in the Mechanical Restoration Alternative), was identified as the preferred alternative because it best meets the purpose, need, goals, and objectives, while also minimizing adverse impacts. In addition, the preferred alternative achieved the following screening criteria, which were jointly developed by the four co-leads (Service, Reclamation, Hoopa Valley Tribe, and Trinity County). The preferred alternative:

- Substantially increases natural production of anadromous fish on the Trinity River mainstem
- Substantially restores inriver and ocean fishing opportunities
- Improves tribal access to trust resources
- Balances environmental and social beneficial and adverse impacts across the Trinity River Basin, Lower Klamath River Basin/Coastal Area, and the Central Valley
- Allows for the continued operation of the TRD including water exports
- Limits flooding impacts on the Trinity River

Given these criteria, the co-leads determined that the Flow Evaluation Alternative represented the best overall approach to substantially increasing natural production of anadromous fish and fishing opportunities, while allowing for continued water exports and flood control. The proposed watershed protection activities were included as part of the preferred alternative because: (1) they have been shown to help restore fish habitat by

reducing sediment inputs to the Trinity River mainstem; (2) they are consistent with the Record of Decision (ROD) for the Northwest Forest Plan and its Aquatic Conservation Strategy to reduce upslope sediment production by improving drainage on necessary roads, while also decommissioning roads that no longer serve management purposes; (3) they are consistent with the Total Maximum Daily Load process established under the Clean Water Act, which has identified the Trinity River as a waterbody impaired by sediment and in need of remedial measures; and (4) a broad range of interest groups specifically requested that non-flow watershed protection measures be fully considered for inclusion into the preferred alternative.

No Action Alternative

The No Action Alternative represents the anticipated future condition in the year 2020 in the absence of project implementation. No Action assumes no implementation of any of the provisions or programs of the CVPIA, and is, therefore, identical to the No Action Alternative in the CVPIA Programmatic EIS (PEIS) being completed by Reclamation.

Under this alternative, approximately 340 thousand acre feet (taf) of water would be released annually down the Trinity River (actual releases may vary due to Safety of Dam releases and other unscheduled events). The remaining water, approximately 870 taf (on average), would be exported to the Central Valley (Table ES-1). Peak Trinity River releases of 2,000 cfs would occur around mid-May; flows during the remainder of the year would range from 300-450 cfs. This alternative assumes that the 27 existing channel rehabilitation projects would be mechanically maintained and that approximately 3,400 cubic yards ($yd^{3)}$ of spawning gravel would be placed in the river every year. The alternative also assumes that other ongoing TRRP projects—such as dredging sediment-control ponds and operation of Buckhorn Reservoir—would continue.

Maximum Flow Alternative

This alternative calls for operating the TRD solely to store and release into the Trinity River all inflow on a prescribed pattern by year type. Scheduled annual releases would average 1,225 taf, ranging from 463 taf in critically dry water years to 2,146 taf in extremely wet water years. Peak releases of 30,000 cfs would occur for about 5 days in May in extremely wet water years. No water would be exported to the Central Valley. The large flows associated with this alternative would reshape and maintain the geomorphology of the river without the aid of mechanical maintenance except for placement of spawning gravel. Spawning gravel needs would average 16,400 yd^3 annually, but could be 100,000 yd^3 or greater in extremely wet water years. Achieving the large releases called for under this alternative would require modification of Trinity Dam.

Flow Evaluation Alternative

This alternative is based on the recommendations in the TRFE. Under this alternative, scheduled annual Trinity River releases would average 595 taf, ranging from 369 taf in critically dry water years to 815 taf in extremely wet water years. Peak releases of 11,000 cfs would occur for 5 days in May in extremely wet water years. Forty-seven mechanical channel rehabilitation projects would be constructed because flows would be too low to initiate necessary geomorphic changes. Approximately 10,300 yd^3 of spawning gravel could

TABLE ES-1
Summary of Impacts

Issue	Hydrologic Conditions or Other Variable	No Action in Year 2020	Compared to No Action					Preferred Alternative to Existing Conditions
			Maximum Flow	Flow Study	Percent Inflow	Mechanical Restoration	State Permit	
Releases into Trinity River	Critically Dry	340,000 af	+36%	+9%	-51%	0%	-65%	+9%
	Dry	340,000 af	+160%	+33%	-5%	0%	-65%	+33%
	Normal	340,000 af	+250%	+87%	+30%	0%	-65%	+87%
	Wet	340,000 af	+340%	+110%	+93%	0%	-65%	+110%
	Extremely Wet	340,000 af	+530%	+140%	+190%	0%	-65%	+140%
Trinity River Exports to Central Valley	Dry Periods	540,000 af	-100%	-30%	-2%	0%	+39%	-28%
	Long-term Average	870,000 af	-100%	-28%	-16%	0%	+23%	-28%
Trinity Reservoir Elevation on Sept. 30	Dry Periods	2,207' msl	+64'	+18'	+25'	No Change	+11'	+8'
	Long-term Average	2,282' msl	-9'	+2'	+4'	No Change	+11'	-3'
Shasta Reservoir Elevation on Sept. 30	Dry Periods	933' msl	-65'	-11'	-1'	No Change	+3'	-17'
	Long-term Average	992' msl	-15'	-3'	No Change	No Change	+4'	-6"
Delta Inflow	Dry Periods	11,830,000 af	-2%	-1%	0%	0%	+2%	0%
	Long-term Average	22,570,000 af	-4%	-1%	-1%	0%	+1%	-1%
Delta Outflow	Dry Periods	6,320,000 af	-1%	0%	0%	0%	-1%	0%
	Long-term Average	14,710,000 af	-3%	-1%	-1%	0%	+1%	-4%
Exports at Tracy and Banks Pumping Plants in the Delta	Dry Periods	3,670,000 af	-5%	-2%	0%	0%	+6%	-3%
	Long-term Average	5,950,000 af	-6%	-1%	0%	0%	+1%	+6%
CVP Deliveries North of Delta	Dry Periods	2,680,000 af	-6%	-4%	0%	0%	+2%	+8%
	Long-term Average	3,120,000 af	-4%	-1%	0%	0%	+1%	11%
CVP Deliveries South of Delta	Dry Periods	1,580,000 af	-13%	-3%	+1%	0%	+13%	-6%
	Long-term Average	2,570,000 af	-13%	-2%	0%	0%	+2%	-3%
Days with Trinity River Temperature Violations	Critically Dry	78%	29%	6%	100%	78%	100%	84%
	Dry	24%	29%	1%	87%	24%	43%	0%
	Normal	2%	28%	1%	86%	2%	61%	3%
	Wet	0%	28%	0%	72%	0%	86%	0%

TABLE ES-1
Summary of Impacts

Issue	Hydrologic Conditions or Other Variable	No Action in Year 2020	Compared to No Action					Preferred Alternative to Existing Conditions
			Maximum Flow	Flow Study	Percent Inflow	Mechanical Restoration	State Permit	
Releases into Trinity River	Critically Dry	340,000 af	+36%	+9%	-51%	0%	-65%	+9%
	Extremely Wet	0%	73%	0%	53%	0%	59%	0%
Months Sac. River Temp. Violations	Long-term Average	20%	23%	20%	20%	20%	16%	14%
Years Shasta Res. Carryover Violations	Long-term Average	12%	14%	12%	12%	12%	10%	9%
Trinity Escapement as % of TRRP[a] Goals	-	.08	.81	.66	.23	.18	.00	.08
Trinity River Fish Harvested	-	11,300	+909%	+741%	+186%	+117%	-100%	0%
Ocean Sportfishing Benefits (millions)	-	$35.2	+16%	+15%	+12%	+12%	-10%	-
Gross Commercial Salmon Revenue (millions)	-	$19.0	+45%	+41%	+28%	+26%	-37%	-
Index of Restoration of Trinity River Tribal Assets	-	.08	.81	.66	.23	.18	.00	.08
Rank of ability to Restore Vegetation to Pre-Dam Conditions	-	5	1 (Best)	2	3	4	6	5
Trinity River Visitor Days	-	317,200	+33%	+22%	-2%	0%	-39%	+79%
Lower Klamath River Visitor Days	-	13,200	+28%	+24%	+8%	+5%	-5%	+84%
Trinity Reservoir Visitor Days	-	796,200	-4%	+1%	+2%	0%	+6%	+66%
Shasta Reservoir Visitor Days	-	5,682,700	-8%	-2%	0%	0%	+2%	+60%
Flooding Impacts to Trinity River (excluding spills)	Properties/Cost (millions)	0/0	112/$14.3	1/$5.0	16/$6.0	0/0	0/0	0/0
CVP M&I Deliveries to Sacramento Valley	Dry Periods	82,000 af	-17.8%	-12.2%	+1.5%	0%	+7.9%	-9%
	Long-term Average	106,000 af	-13.3%	-3.5%	-0.6%	0%	+2.4%	-22%

TABLE ES-1
Summary of Impacts

Issue	Hydrologic Conditions or Other Variable	No Action in Year 2020	Compared to No Action					Preferred Alternative to Existing Conditions
			Maximum Flow	Flow Study	Percent Inflow	Mechanical Restoration	State Permit	
CVP M&I Deliveries to San Joaquin Valley	Critically Dry	340,000 af	+36%	+9%	-51%	0%	-65%	+9%
	Dry Periods	21,000 af	-1.2%	-0.4%	+0.4%	0%	+2.1%	-14%
	Long-term Average	27,000 af	-2.2%	-0.4%	-0.1%	0%	+0.5%	-11%
CVP M&I Deliveries to Bay Area	Dry Periods	231,000 af	-35.6%	-22.4%	+4.7%	0%	+20.7%	+8%
	Long-term Average	279,000 af	-24.8%	-5.1%	-0.3%	0%	+5.1%	-6%
San Joaquin Valley Agriculture (millions)	Dry Periods	$5,168	+0.1%	+0.1%	0.0%	0%	+0.1%	+15.6%
	Long-term Average	$5,195	-0.2%	0.0%	0.0%	0%	+0.0%	+15.6%
Tulare Basin Agriculture (millions)	Dry Periods	$4,513	+0.2%	+0.1%	0.1%	0%	+0.1%	+18.4%
	Long-term Average	$4,557	-0.1%	0.0%	0.0%	0%	+0.0%	+17.8%
San Felipe Unit Agriculture (millions)	Dry Periods	$63	-25.8%	-9.9%	+3.6%	0%	+37.8%	-16.4%
	Long-term Average	$98	-31.1%	-6.0%	-1.6%	0%	+5.2%	-9.8%
CVP Hydropower Energy	Dry Periods	2,946 GWh	-25%	-7%	+1%	0%	+9%	-
	Long-term Average	5,169 GWh	-21%	-6%	-3%	0%	+4%	-
Value of Hydro-power (millions)	Long-term Average		-$26.0	-$5.6	-$7.0	$0	+$5.9	-
Cost per MWh for Ave. Customer	Synthetic Ave. Year		+$0.96	+$0.21	+$0.26	$0	-$0.22	-
Implementation Costs 1998-2020 (excluding mitigation and ongoing TRRP[a] projects) [b]	Total Cost 1998-2020 (millions)	$1.5	$30.3-$80.2	$71.8-$115.8	$13.8	$74.3	$1.6	-
	Major Expense	Spawning Gravel	Modify Dams and Spawning Gravel	Channel Rehab. and Adaptive Manage.	Channel Rehab-ilitation	Channel Rehab. and Watershed Protection	Spawning Gravel	-

A

[B]Trinity River Restoration Program

[c]Mitigation includes residence and bridge relocation/modification, reservoir boat ramp modification, and other costs. Other TRRP projects include dredging of sediment ponds, operation of Buckhorn Dam, operation of the Trinity River Salmon and Steelhead Hatchery, and other projects.

be added to the river annually depending on year type and river condition. The alternative also calls for implementation of an adaptive management program. Adaptive management is a process that uses scientific methods to develop and test various management choices. Adaptive management is a valuable tool in managing systems or projects that are characterized by complexity, change, and uncertainty.

Percent Inflow Alternative

This alternative approximates natural flow patterns–at a reduced scale–by releasing water into the Trinity River at a rate of 40 percent of the previous weeks inflow into Trinity Reservoir. Historical records suggest that Trinity River releases would average 500 taf annually (range 165-978 taf) with a peak release around 11,000 cfs. This alternative includes the mechanical construction of 47 channel rehabilitation projects. Spawning gravel needs are estimated to average 950 yd^3 annually (range 0-4,650 yd^3).

Mechanical Restoration Alternative

This alternative uses the same water management as No Action (i.e., annual releases of 340 taf). It builds upon No Action by constructing 47 new channel rehabilitation projects, mechanically maintaining both new and existing projects, and dredging 10 pools in the Trinity River mainstem. Spawning gravel needs would be the same as No Action. The alternative includes an ambitious watershed protection program (road decommissioning, maintenance) to reduce sediment input into tributaries and subsequently, the mainstem.

State Permit Alternative

This alternative was evaluated because it is the minimum flow under Reclamation's existing water permit with the State Water Resources Control Board (SWRCB). Evaluating the impacts of this alternative–even though it does not satisfy the purpose and need–facilitates amending the existing SWRCB permit. The alternative would reduce scheduled Trinity River releases to 120.5 taf annually, regardless of water-year class. Peak releases would be 250 cfs for 30 days in November. No mechanical channel rehabilitation projects would be created or maintained. Spawning gravel placement would average 3,700 yd^3 annually, all of which would be associated with unscheduled releases (e.g., Safety of Dam releases).

Affected Environment and Environmental Consequences

The affected environment was generally divided into three geographic regions; the Trinity River Basin, the Lower Klamath River Basin / Coastal Areas, and the Central Valley.

The majority of the impact analyses depended, either directly or indirectly, on two models: the Project Simulation Model (PROSIM) and the healthy river model. PROSIM is a computer model that is used to predict changes in CVP and State Water Project (SWP) operations under differing management and hydrologic scenarios. The model predicts monthly changes in water volumes at discrete points (e.g., reservoirs) in the CVP and SWP. Assumptions concerning operations (e.g., legal requirements), population growth, and land use changes were entered into the model. For purposes of the DEIS / EIR, the model used historical hydrological data from 1922-1990. The alternatives were assessed by using either

the PROSIM output directly, or by using other models which used the PROSIM output as input (e.g., hydropower generation and agricultural production models).

The healthy alluvial river model used a set of 10 alluvial river attributes to assess the ability of the alternatives to restore the health of the Trinity River. The attributes were: (1) channel geomorphology is spatially complex; (2) flows and water quality are predictably variable; (3) channel-bed surfaces are frequently mobilized; (4) channel-bed surfaces are periodically scoured and refilled; (5) fine and coarse sediment budgets are approximately balanced; (6) channel periodically migrates; (7) channel has a functional floodplain; (8) channel is occasionally reset during very large floods; (9) riparian plant communities are diverse and self-sustaining; and (10) the groundwater table fluctuates naturally with changing stream flows. The healthy alluvial river model was used to directly or indirectly assess changes in Trinity River geomorphology, fish populations, plant and wildlife communities, and other impacts.

Geomorphic Environment

Rivers are comprised of three primary building blocks: various sizes of sediment, varying amounts and stages of vegetation, and varying amounts of water. The interaction of these three building blocks can provide a diversity of physical structures, such as point bars and riffle-pool sequences, that perform a variety of environmental functions including providing habitat for fish. The Trinity River immediately downstream of Lewiston was once a meandering alluvial river characterized by such features. Since operation of the TRD, substantial portions of the river have developed berms that effectively channelize the river, changing its habitat characteristics. A healthy alluvial river model was created to assess the effectiveness of the alternatives in restoring pre-dam Trinity River attributes. No Action, Maximum Flow, Flow Evaluation, Percent Inflow, Mechanical Restoration, and State Permit scored 8, 81, 66, 23, 18, and 0 percent, respectively, using the model (a score of 100 would fully achieve all the pre-dam attributes. The healthy alluvial river model was the foundation on which several other analyses depended (e.g., Fisheries). Impacts to the geomorphic environment in the lower Klamath River and Central Valley (i.e., Sacramento River) where negligible.

Water Resources

TRD operations are integrated with operations of the Shasta Division to allow for maximizing the use of TRD exports for meeting agricultural, M&I, environmental (including fishery) and Delta water quality needs. Water resources were assessed in terms of surface hydrology and water management, and groundwater. Reclamation's PROSIM model (using 1922-90 hydrologic data) was the primary tool used in assessing changes in surface hydrology and water management. Impacts to surface hydrology and water management (i.e., CVP operations) were evaluated; however, these effects were not considered impacts to the environment per se, but rather, they were agents that lead to impacts assessed elsewhere in the document (e.g., Water Quality). The most affected CVP contractor group is assumed to be those holding water service contracts, given such contracts provide for reductions in water deliveries of up to 100 percent in particularly dry years.

In contrast to surface hydrology and water management, effects on groundwater were considered an environmental impact. Historically, extensive groundwater pumping occurred in the Central Valley to meet agricultural needs, sometimes leading to severe overdraft conditions and land subsidence. Although surface water development (e.g., CVP and SWP) reduced reliance on groundwater, overdraft pumping still occurs. For example, annual withdrawals in the San Joaquin area exceed groundwater yield by 200,000 af. The analysis in the DEIS/EIR assumed that reduced CVP water deliveries would lead to increased groundwater pumping in the Central Valley. Groundwater pumping in the Trinity River Basin and lower Klamath River is negligible.

Trinity River Basin. Surface hydrology and water management effects to the Trinity River in the year 2020 would not change under No Action assumptions. Under No Action and Mechanical Restoration, Trinity River flows at Lewiston would remain the same as current conditions (340,000 af/yr). These flows are generally higher than those in the two decades following dam construction, but they are still far below pre-dam levels. As evidence of that, 340,000 af/yr represents the third lowest recorded and potential flow (based on Trinity Reservoir inflows) at Lewiston since 1912. Maximum Flow, Flow Evaluation, and Percent Inflow would, on average, increase releases above No Action levels by 263, 75, and 41 percent, respectively, whereas State Permit would reduce releases by 65 percent. The effect of TRD releases on river flows decreases with distance downstream of the dam (most dramatically, from the North Fork Trinity River confluence on down) due to the accretion of flows from tributaries.

Lower Klamath River Basin/Coastal Area. Maximum Flow, Flow Evaluation, and Percent Inflow would increase Klamath River discharges to the ocean by approximately 7, 2, and 1 percent, respectively. State Permit would decrease Klamath discharges by 2 percent. These changes are generally negligible.

Central Valley. Under No Action and Mechanical Restoration the TRD would divert approximately 900 taf annually to the Central Valley (actual diversions may be less due to spills and Safety of Dam criteria). Under Maximum Flow, Flow Evaluation, Percent Inflow, and State Permit the TRD would divert 0, 655, 750, and 1130 taf, respectively. Maximum Flow, Flow Evaluation, and Percent Inflow would reduce the amount of water delivered to CVP contractors and Delta inflow. Under No Action conditions, groundwater pumping, and associated land subsidence, would increase in some parts of the Central Valley (e.g., Yolo, San Joaquin/Tulare areas due to increased water demand driven by population growth. Maximum Flow would substantially exacerbate these effects. Flow Evaluation and Percent Inflow would result in localized groundwater elevation declines and land subsidence compared to No Action. Impacts would be most substantial in the vicinity of areas dominated by water service contractors who are assumed to increase groundwater pumping in response to reduced CVP deliveries.

Water Quality

The primary water quality concerns in the DEIS/EIR are Trinity and Sacramento River water temperatures, Trinity River turbidity, and Bay-Delta salinity levels. Criteria regarding Trinity River temperature, turbidity, and sediment are administered by the North Coast Regional Water Quality Control Board. The temperature criteria were established to

maintain cool water temperatures for the benefit of the fishery. In regards to the Sacramento River, the 1993 biological opinion on CVP operational impacts to the endangered winter run chinook salmon is a significant management criteria. The opinion requires certain temperatures at various points in the Sacramento River for the conservation of the species, and that Shasta Reservoir be operated to maintain at least 1.9 maf of storage on September 30. TRD exports are used in conjunction with Shasta releases to assist in meeting the criteria.

Trinity River Basin. Flow Evaluation meets the state temperature criteria 99 percent or more of the time in all water-year classes except critically dry, where the criteria are met 94 percent of the time. That compliance rate is substantially better than all the other alternatives including No Action. The improvement is in large part, due to shifting TRD diversions from spring to summer, thereby not allowing water to warm in Lewiston Reservoir. Short-term exceedance of the state turbidity criteria could occur as a result of the channel rehabilitation projects in Flow Evaluation, Percent Inflow, and Mechanical Restoration. These projects would undergo site-specific environmental review that could include mitigating measures to reduce turbidity. The watershed protection work in Mechanical Restoration would reduce sediment inputs into tributaries, and subsequently, into the Trinity River by 240,000-480,000 yd^3/yr, which is approximately 9-17 percent of the average annual sediment produced in the basin.

Lower Klamath River Basin/Coastal Area. Lewiston Dam releases would have a negligible concern on lower Klamath River temperatures due to the large water volumes in the Klamath and the accretion of tributary inflow to the Trinity River below the dam. The watershed protection work in Mechanical Restoration could result in minor reductions to lower Klamath sediment loads.

Central Valley. Model simulations indicate that increased water demands due to population growth and other factors not related to the alternatives in the DEIS/EIR would increase temperature violations in the Sacramento River from 14 to 20 percent from 1995 to 2020. Maximum Flow was the only alternative that substantially increased violations above No Action levels. Similarly, only Maximum Flow increased Shasta carryover violations. Maximum Flow would result in the largest reduction in Delta inflows, and therefore, the most adverse impacts to Delta water quality conditions. The Flow Evaluation and Percent Inflow alternatives were also identified to have modeled impacts to Delta water quality.

Fishery Resources

The primary fishery resources in the Trinity River are chinook (fall and spring runs) and coho salmon and steelhead (winter and summer runs). Pre-dam estimates of run size suggest dramatic declines since construction of the TRD. For example, the post-dam natural inriver spawning escapement for fall chinook is only 27 percent of the pre-dam estimate. Current salmon and steelhead populations are all well below the Trinity River Restoration Program (TRRP) goals (Table ES-2). Currently, Trinity River coho are listed as threatened under the federal Endangered Species Act and steelhead are listed as a candidate species.

TABLE ES-2
Trinity River Restoration Program Goals and Recent Escapement Estimates

Population	Inriver Goals	Recent Escapements as Percent-age of Goals	Hatchery Goals	Total Goals
Fall Chinook	62,000	20%	9,000	71,000
Spring Chinook	6,000	40%	3,000	9,000
Coho	1,400	14%	2,100	3,500
[a]Winter Steelhead	40,000	5%[b]	10,000	50,000

[a]Goals for summer steelhead have not been established. Recent estimates of run size range from 20-1,037; pre-dam estimates upstream of Lewiston averaged 8,000.

[b]Actual escapement may be higher because winter flows often preclude sampling.

Implementation of the alternatives for purposes of restoring the natural production of anadromous fish in the Trinity River could also effect other fish populations in the river, in the TRD reservoirs, and in the Central Valley and Bay-Delta. Federally listed species that could be indirectly impacted include the endangered Sacramento River winter run chinook, the threatened Delta smelt and Sacramento splittail, and the proposed spring and fall runs of the Central Valley chinook.

Trinity River Basin. Under No Action, the combined spawning escapement for chinook and coho salmon and steelhead in the year 2020 would represent only 8 percent of the TRRP goal. Maximum Flow, Flow Evaluation, Percent Inflow, and Mechanical Restoration would increase the spawning escapement to 81, 66, 23, and 18 percent of the goals, respectively. The alternatives would likely also improve conditions for resident native and non-native fish. The bass fishery in Trinity Reservoir would be adversely affected by Maximum Flow; spawning and rearing indices fell below the target range in 10 percent of the simulated years. Flow Evaluation and Percent Inflow could also adversely affect fish spawning in the reservoir, but to a less than significant degree whereas State Permit would increase spawning habitat. (Inriver and reservoir sport fishing economics were assessed in the Recreation section: The economic value of tribal inriver fishing was not assessed); however, tribes are allocated 50 percent of the allowable harvest).

Lower Klamath River Basin/Coastal Area. The increased flows and other actions associated with Maximum Flow and Flow Evaluation would substantially benefit native anadromous fish in the lower Klamath River and coastal areas. Conversely, the decreased flows associated with State Permit would have substantial adverse affects. For resident native and non-native fish, the Maximum Flow and Flow Evaluation would also result in some improvement; the Percent Inflow and Mechanical Restoration would result in no change compared to No Action; and the State Permit would result in adverse impacts. Ocean commercial and sport fishing would benefit substantially under Maximum Flow and Flow Evaluation. The largest benefits would occur in the Klamath Mountain Zone (KMZ) regions in California and Oregon and the Mendocino Coastal Area in California where salmon landed, gross harvest revenue, and net harvest income to commercial fishers would all increase from 425-933 percent over No Action levels and economic benefits to sport fishing (including both private and charter boat operators) would increase 52-74 percent. Benefits in the San Francisco and Monterey regions would be minor or non-existent.

Central Valley. Compared to 1995 existing conditions, No Action showed adverse temperature related impacts to Sacramento River salmon due to increased water demands in 2020. Maximum Flow, Flow Evaluation, and Percent Inflow showed adverse impacts above those in No Action. Impacts to fishery economics in the Central Valley would be negligible.

Tribal Trust

The importance of the Trinity and Klamath Rivers to the Hoopa and Yurok Tribes is evident by the location and shape of the reservations. The 12-mile-square Hoopa Valley Indian Reservation is bisected by the lower portion of the Trinity River and the Yurok Reservation is bisected by the Klamath River from its mouth to the confluence with the Trinity. A wide variety of trust assets, ranging from fish to riparian plants to wildlife, could be affected by the alternatives. Therefore, it was decided to use the healthy alluvial river model as a tool for assessing impacts to tribal assets. The DEIS/EIR focuses on the Hoopa Valley and Yurok Tribes; however, the alternatives could indirectly affect other tribes in the region.

Trinity River Basin and Lower Klamath River Basin/Coastal Area. Based on the healthy alluvial river model, the Trinity River would exhibit in the year 2020 approximately 8 percent of the attributes it had prior to the dams. In contrast, Maximum Flow, Flow Evaluation, Percent Inflow, Mechanical Restoration, and State Permit would result in a Trinity River in the year 2020 that exhibits 81, 66, 23, 18, and 0 percent, respectively, of the pre-dam attributes. Maximum Flow and Flow Evaluation were determined to provide substantial benefits to tribal assets whereas Percent Inflow and Mechanical Restoration provided only marginal improvements.

Vegetation, Wildlife, and Wetlands

Prior to dam construction, the hydrograph of the Trinity River was characterized by high winter and spring flows and greatly reduced summer flows, with great inter-year variability. The result was a mosaic of early-successional (a young vegetation community) willow-scrub vegetation and scattered patches of more mature willow-alder and alder-dominated communities. Due to the TRD, riparian vegetation has increased by 300 percent in the 40 river miles immediately downstream of the dam. The vegetative communities have also matured, with detrimental effects. Wildlife impacts were assessed for the bald eagle, foothill yellow-legged frog, western pond turtle, and willow flycatcher. The eagle is federally listed as threatened, the flycatcher is state listed as endangered. The frog and turtle are rare riverine species that, along with the flycatcher, serve as indicators of impacts to wildlife in general. Wetland acreage has likely declined since construction of the TRD because the river channel migrates less frequently and less area is now inundated by the peak flows.

Trinity River Basin. Under No Action the harmful encroachment and maturation of riparian vegetation would continue. Maximum Flow ranked best in restoring pre-dam riparian conditions, followed by Flow Evaluation, Percent Inflow, and Mechanical Restoration, in that order. State Permit would result in further degradation compared to No Action levels. No Action would likely result in continued adverse impacts to the foothill yellow-legged frog, western pond turtle, and willow flycatcher, whereas Maximum Flow, Flow Evaluation, Percent Inflow, and Mechanical Restoration would all be beneficial as a

result of increasing suitable habitat. However, Percent Inflow may be most beneficial to the frog and turtle because flows would coincide with natural hydrology. Flow Evaluation and Percent Inflow could displace a small amount of remnant fringe wetlands in the short-term as a result of the channel rehabilitation projects; however, it is anticipated that the increased flows associated with the alternatives would result in more wetland acreage in the long-term. State Permit would result in a decrease in wetland acreage.

Lower Klamath River Basin/Coastal Area. Significant impacts to riparian vegetation, wildlife, and wetlands are not anticipated in this geographic area.

Central Valley. Significant impacts to riparian vegetation, wildlife, and wetlands are not anticipated in this geographic area.

Recreation

Recreation related impacts were assessed for the Trinity River and for CVP reservoirs, primarily Trinity and Shasta. Recreation related impacts include those to rafting, kayaking, camping, swimming, boat ramps, and sport fishing. Impacts from Trinity River and lower Klamath River sport fishing were assessed as part of the recreation assessment (commercial fishing and ocean sport fishing were assessed under Fishery Resources; tribal fishing was not evaluated from an economic perspective). Recreation impacts were assessed in terms of opportunities, use (i.e., visitor days), and benefits (willingness to pay).

Trinity River Basin. All of the alternatives showed some benefits and some adverse impacts to recreation opportunities on the Trinity River, depending on the activity, time of year, and water-year class. Maximum Flow showed substantial improvement in terms of river use and benefits, but adverse impacts at Trinity Reservoir due to the large fluctuations in reservoir levels which makes boat ramps unusable substantially more often than is expected under No Action. Flow Evaluation was the only alternative to show increases in recreation use and benefits at both the river and the reservoir. State Permit showed the most adverse impacts on the river by a substantial amount (it essentially ended sport fishing), but it showed the largest increase in reservoir use and benefits, although by a comparatively smaller margin. The Trinity River is designated a federal and state Wild and Scenic River, primarily due to its fishery. Maximum Flow and Flow Evaluation would be substantially better at meeting the purposes of the designation than would the other alternatives.

Lower Klamath River Basin/Coastal Area. The only measurable recreation impacts on the lower Klamath River were those related to sport fishing. Maximum Flow and Flow Evaluation substantially increased sport fishing use and benefits whereas State Permit showed an adverse impact.

Central Valley. Maximum Flow substantially adversely impacted recreation use and benefits at Shasta Reservoir. Flow Evaluation modestly adversely impacted reservoir recreation whereas State Permit showed modest benefits.

Land Use

The Trinity and lower Klamath River Basins are comprised primarily of forested public land; small communities occur along the Trinity and Klamath Rivers and some of their

tributaries. Land use in the Central Valley is dominated by agriculture. There are also several large urban areas and numerous smaller communities. Impacts were assessed to residential/M&I uses, agricultural uses, and real estate.

Trinity River Basin. Scheduled peak releases under No Action would not flood existing residences and structures along the Trinity River; however, uncontrolled operational spills have historically inundated such areas and could occur again in the future. Maximum Flow would cause the most flood damage, followed by Percent Inflow, Flow Evaluation, State Permit, and Mechanical Restoration, in that order. Maximum Flow would make inaccessible 79 properties due to road flooding. Flooding impacts associated with Percent Inflow would be larger than Flow Evaluation (even though their peak releases are comparable) because the peak releases would likely coincide with high tributary inflows. Impacts under State Permit could be slightly higher than No Action (even though scheduled peak releases are less) due to the increased likelihood of major spill events. No impacts to M&I or agricultural lands are anticipated. Based on the assumption that real estate values along the Trinity River would improve indirectly with increases in fish production, Maximum Flow and Flow Evaluation ranked highest in increasing property values. Based on the assumption that the value of real estate adjacent to the Trinity Reservoir would increase with decreasing range of reservoir surface-water fluctuations, Flow Evaluation ranked first overall in increasing property values, followed by Maximum Flow, Percent Inflow and State Permit (tied), and No Action and Mechanical Restoration (tied).

Lower Klamath River Basin/Coastal Area. Impacts to residential/M&I, agriculture, and real estate are not anticipated in this region.

Central Valley. Under No Action and average hydrological conditions, M&I water supplies in the CVP service areas would generally be adequate in the year 2020; however, drought conservation and additional supplies would be needed during dry periods. Maximum Flow would decrease M&I supplies by 8-13 percent over the long-term and 22 percent during dry periods. Retail prices would increase by approximately one to two percent depending on the subregion. Changes to CVP M&I supplies under Flow Evaluation and Percent Inflow would be modest to negligible, with retail water prices increasing less than one percent over the long-term. Conversely, retail water prices would decrease by less than one percent under State Permit.

Potential impacts to agricultural production would be greatest for the Maximum Flow. Alternative, given no TRD exports would occur under this alternative. Average long-term deliveries would be reduced by 366,000 af; however, it was assumed that much of this would be replaced by additional groundwater pumping (additional pumping would not be an option in some areas so fallowed land could increase). Impacts to irrigated acres and gross revenue would be especially severe to water service contractors (because of the nature of their contracts) such as those in the San Felipe Unit, Tehama-Colusa, and Westlands service areas. Depreciation in land values could occur in these areas. Under Maximum Flow, impacts during dry periods are proportionately less than those for No Action due to the assumption that water conservation measures would be implemented. Flow Evaluation and Percent Inflow would generally result in similar types of impacts to Central Valley agriculture, although at a reduced scale. The additional deliveries resulting from State Permit did not show large benefits due to the assumption that groundwater pumping

would be reduced accordingly. Maximum Flow also had the largest impact on real estate values associated with Shasta Reservoir.

Power Resources

The CVP includes 11 hydroelectric generation facilities; the four TRD facilities (Trinity, Lewiston, Judge Francis Carr, and Spring Creek powerplants) generate approximately 30 percent of all CVP power and are comparatively efficient due to the high elevation of the reservoirs. CVP hydropower is transmitted and distributed throughout much of California in an extensive power grid operated by the Western Area Power Administration. Due to this extensive grid, regional analyses of power were not conducted. Hydropower production is an authorized purpose of the CVP, but is subordinate to navigation, flood control, water supply, fish and wildlife, and other purposes. Currently, about 30 percent of the power generated by the CVP is used to operate the project (known as project use loads: e.g., the Delta pumps). Preference power customers (e.g., municipalities and irrigation districts), of which there are 78, are specifically entitled to preference in terms of the remaining power.

Simulations of 1920-90 hydrologic data indicate that Maximum Flow, Flow Evaluation, and Percent Inflow would reduce the long-term energy production of the CVP by 21, 6, and 3 percent, respectively. However, some of this loss power generation would be offset by decreased project use loads as a result of reduced exports (e.g., less water would be pumped from the Delta). Indeed, Flow Evaluation and Percent Inflow showed an increase in energy available for sale in September during average conditions. Long-term power generation would remain unchanged under Mechanical Restoration and increase four percent under State Permit. Flow Evaluation and Percent Inflow were designed to delay TRD exports to later in the summer (compared to No Action), in part to improve Trinity River temperatures. A byproduct of that shift is an increase in on-peak power generation. The value of hydropower generation impacts ranged from a loss of $26 million under Maximum Flow to an increase of $6 million under State Permit.

Socioeconomics

For purposes of socioeconomics analysis the Trinity River Basin was defined as Shasta and Trinity Counties, due to the interaction between the counties in regards to recreation-related spending. Impacts to the Lower Klamath River Basin / Coastal Areas were assessed for each of six different coastal regions between Monterey, California, and the Washington / Oregon border.

Trinity River Basin. Projected growth in the Trinity / Shasta County area between 1995 and 2020 is expected to be modest compared to other parts of California. Indeed, Trinity County experienced a slight population decline from 1996 to 1997, possibly due to the decline in the timber industry. Nevertheless, natural resource related spending will likely continue to be a comparatively large portion of the regional economy. Maximum Flow showed a long-term loss of a small number of jobs in the region due primarily to adverse impacts on Trinity and Shasta Reservoirs (modifying Trinity Dam would result in a short-term increase). In contrast, Flow Evaluation showed a small increase in jobs and $3.2 million in annual economic output due primarily to increased recreation-related spending along the Trinity River. Changes due to Percent Inflow and Mechanical Restoration were modest. State Permit had the most adverse employment impacts.

Lower Klamath River Basin/Coastal Area. Socioeconomic benefits were substantial from the Mendocino Coastal Area northwards. For example, the North/Central Oregon Coastal area showed increases of 400-600 jobs for the alternatives that increased Trinity River flows. About half of the jobs occurred in the commercial fishing and seafood processing sectors. Total annual output in the region increased $36-51 million and income increased $13-19 million for the alternatives that increased flows. The Mendocino, KMZ-California, and KMZ-Oregon Coastal Areas also showed improvements in commercial fishing and seafood processing sectors, as well as in wholesale and retail trade and lodging sectors. In contrast, the San Francisco Coastal Area showed adverse impacts as a result of the alternatives that increase Trinity River flows, due primarily to reduced water deliveries (via the Sacramento River) to agricultural contractors. The Monterey Coastal Area only showed impacts under State Permit, which assumed that salmon harvests would be closed due to the virtual elimination of Trinity River stocks.

Central Valley. The assumptions used in this DEIS/EIR project that the Central Valley will undergo dramatic changes between 1995 and 2020. For example, under No Action it is projected that the Sacramento and San Joaquin Valleys and Tulare Basin will experience increases of approximately 725,000, 800,000, and 400,000 jobs, respectively, in the economic sectors assessed. Similarly, economic benefits in the assessed sectors are projected to double between 1995 and 2020. Model simulations showed that the alternatives that reduced TRD exports would have adverse economic and employment effects in the Central Valley, and that the degree of impact was correlated with the size of the exports. The economic sectors most impacted would be miscellaneous retail, retail and wholesale trade, farm machinery and equipment, and cotton production.

Cultural Resources

Trinity River Basin. Maximum Flow, Flow Evaluation, Percent Inflow, and State Permit could result in some impact to cultural sites along Trinity and Lewiston Reservoirs as a result of changing water-levels. All of the alternatives could result in impacts as a result of activities—outside of the Trinity River floodplain—associated with spawning gravel placement and/or channel rehabilitation projects. The watershed protection component of Mechanical Restoration could result in impacts to cultural resources. All mechanical ground-disturbing activities would go through site-specific environmental reviews prior to implementation.

Lower Klamath River Basin/Coastal Area. Cultural resource impacts from any of the alternatives are not anticipated in this geographic area.

Central Valley. Cultural resource impacts from any of the alternatives are not anticipated in this geographic area.

Air Quality

Trinity River Basin. Flow Evaluation, Percent Inflow, and Mechanical Restoration could all result in some increase to airborne particulate matter (PM) as a result of activities associated with the channel rehabilitation sites (e.g., access road building), acquisition and transportation of spawning gravel, dam improvements (Maximum Flow Alternative only) and other

actions involving heavy machinery. Mechanical Restoration impacts would likely be greater since the alternative includes an extensive watershed protection program.

Lower Klamath River Basin/Coastal Area. Air quality impacts from any of the alternatives are not anticipated in this geographic area.

Central Valley. A decrease in water deliveries could result in fallowing some cropland south of the Delta, with an associated minor increase in wind erosion and airborne PM if effective cover crops are not planted.

Environmental Justice

Federal agencies are required to identify and address the disproportionately high and adverse human health or environmental effects of their actions on minorities and low-income populations and communities, as well as the equity of the distribution of the benefits and risks of their decisions.

Trinity River Basin and Lower Klamath River Basin/Coastal Area. A high percentage of Native Americans live in the Trinity and Klamath River Basins. They would be affected from the alternatives in proportion to the alternatives' ability to restore the Trinity River, especially the fishery. Under Maximum Flow, substantial environmental justice impacts could occur to Hispanic populations (as a result of reduced irrigation) in Santa Clara County, located in the San Francisco Coastal Area. No environmental justice impacts would occur to non-Native Americans under the other alternatives.

Central Valley. Under Maximum Flow, substantial environmental justice impacts could occur to Hispanic populations in Colusa, Merced, and Madera Counties. No environmental justice impacts were observed under the other alternatives.

Other Impacts and Commitments

Cumulative Impacts

Cumulative impacts are the impacts on the environment which result from the incremental impacts of the proposed action when added to other past, present, and reasonably foreseeable future actions, regardless of what agency (federal or non-federal) or entity undertakes such other actions. The proposed action in the DEIS/EIR may be implemented in an interactive manner with other concurrent projects. In addition, those other projects may affect the impacts of the proposed action. The cumulative impact analysis addressed impacts associated with several related actions including:

- Implementation of CVPIA
- SWRCB water rights process
- CALFED Bay-Delta Program
- Deregulation of the electric industry in California
- Changes in federal farm support programs

- Changes in demand for agricultural products
- Changes to fisheries management
- Changes in demand/supply for timber products
- Changes in demand for recreational activities in the Trinity River Basin not related to the Trinity River or the mainstem reservoirs
- Changes in Trinity River Basin Consumptive Water Use

Potential impacts associated with the Trinity River DEIS/EIR Preferred Alternative were assessed in conjunction with other reasonably foreseeable actions relating to the CVP, most notably the CVPIA PEIS preferred alternative were analyzed using the PROSIM model and the assumption that CVP contractors take their full contract allocations in 2020. In conducting the initial cumulative impacts analysis it was found that the cumulation of the other actions stressed the CVP to such a point that the project could not operate in some dry years. Specifically, it was found that simulated storage levels in Shasta Reservoir during the dry period (1928 - 1934) were below feasible operating levels. Therefore, a second cumulative impact analysis (i.e., PROSIM run) was conducted with the assumption that the minimum storage level in Trinity Reservoir would be reduced from 600 taf, (the assumed minimum storage level for the Preferred Alternative) to 400 taf (the minimum storage for No Action, but greater than the approximately 225,000 ac-ft threshold necessary to operate the reservoir). This assumption was made toward being consistent with the assumptions made for other CVP storage facilities, in that all other facilities were modeled to operate at their operational limits. Using the 400 taf threshold as a floor, the 600 taf carryover threshold was met in 80 percent of the modeled years (compared to 90 percent of the years under No Action).

Overall, the cumulative effect of increased demand (due to increased population growth), coupled with actions which would reallocate supplies, such as the CVPIA and some of the alternatives described in this document, would decrease CVP deliveries in dry years. Full deliveries to water service contractors would be less likely to occur. For example, full deliveries to water service contractors south of the Delta would be reduced from 45 percent of the years (under the existing conditions run) to 15 percent of the years in 2020 under the cumulative impacts scenario. Years where no deliveries would be made to water service contractors increased from one percent to seven percent.

As a result of increased water demand assumed for the cumulative impacts analysis, minimum contract deliveries, and even deliveries to water rights holders, cannot be maintained in the American River Division in some critically dry water years. In the San Joaquin Valley and the Tulare Basin the reduction in water deliveries would result in the loss of irrigation to about 50,000 and 13,000 acres, respectively. In the San Felipe Unit there would be a loss of irrigation to 15,000 acres and an associated loss of $26 million in gross revenue as a result of the cumulative impacts.

TABLE ES-3
Cumulative Impact Water Deliveries

Type of Period	Simulated Annual CVP Deliveries[a] (taf)			
	1995 Existing Conditions	No Action in 2020	Preferred Alternative in 2020	With Cumulative Impacts
Long-term Average	5,380	5,690	5,600	5,580
Dry Period	4,020	4,260	4,100	3,980
Wet Period	5,860	6,200	6,180	6,380

[a]CVP deliveries include deliveries to Agricultural and M&I Water Service Contractors, Sacramento River water rights contractors, other water rights contractors, and San Joaquin River Exchange Contractors. CVP deliveries do not include refuge water supplies.

Environmental Commitments and Mitigations

Table ES-4 presents significant impacts and potential mitigation.

TABLE ES-4
Summary of Significant Adverse Environmental Impacts and Proposed Mitigation

DEIS/EIR Action Alternative	Description of Significant Impact	Mitigation	Level of Significance after Mitigation
		Water Resources	
Groundwater			
Maximum Flow Flow Evaluation Percent Inflow	Significant declines in groundwater levels could occur in the Sacramento Valley and Tulare Basin regions, primarily in areas receiving CVP agricultural service contract water.	Although changes to surface water supply *per se* were not considered an impact, the development of additional water supplies to meet demands would lessen the associated impacts (e.g., groundwater impacts). A number of demand- and supply-related programs are currently being studied across California, many of which are being addressed through the ongoing CALFED and CVPIA programs and planning processes. Although none of these actions would be directly implemented as part of the alternatives discussed in this DEIS/EIR, each could assist in offsetting impacts resulting from decreased Trinity River exports. Examples of actions being assessed in the CALFED and CVPIA planning processes include: • Develop and implement additional groundwater and/or surface-water storage. Such programs could include the construction of new surface reservoirs and groundwater storage facilities, as well as expansion of existing facilities. Potential locations include sites throughout the Sacramento and San Joaquin Valley watersheds, as well as the Delta. • Purchase long- and/or short-term water supplies from willing sellers (both in-basin and out-of-basin) through actions including, but not limited to, temporary or permanent land fallowing. • Facilitate willing buyer/willing seller inter- and intra-basin water transfers that derive supplies from activities such as conservation, crop modification, land fallowing, land retirement, groundwater substitution, and reservoir re-operation. • Promote and/or provide incentive for additional water conservation to reduce demand. • Decrease demand through purchasing and/or promoting the temporary fallowing of agricultural lands. • Increase water supplies by promoting additional water recycling.	Significant
Maximum Flow Flow Evaluation Percent Inflow	The groundwater level declines could result in increased land subsidence within limited areas within the San Joaquin Valley and Tulare Basin regions.	See above.	Significant

TABLE ES-4
Summary of Significant Adverse Environmental Impacts and Proposed Mitigation

DEIS/EIR Action Alternative	Description of Significant Impact	Mitigation	Level of Significance after Mitigation
Maximum Flow Flow Evaluation Percent Inflow	Additional groundwater pumping could result in upwelling of groundwater high in TSD into productive groundwater zones within limited areas within the San Joaquin Valley and Tulare Basin regions.	See above.	Significant
		Water Quality	
Flow Evaluation Mechanical Restoration Percent Inflow	The channel rehabilitation projects would result in short-term Trinity River turbidity impacts.	• A 401 water quality certification would be obtained from the NCRWQCB, and a construction procedure would be developed to meet the Basin Plan turbidity requirements. Monitoring would be conducted as specified by the NCRWQCB, and efforts would be taken to reduce levels if they are 20 percent or more over background (e.g., isolating the work area and/or slowing or halting construction until the 20-percent level is achieved). • Notify individual diverters with state diversion permits within 2 miles downstream of any mechanical channel rehabilitation activity at least 2 days in advance of activities likely to produce turbidity.	Less than significant
Maximum Flow Flow Evaluation Percent Inflow	Violate temperature objectives and carryover storage criteria established in the Sacramento River winter run chinook salmon Biological Opinion.	Significant impacts identified for the increased frequency of temperature and carryover storage violations would need to be evaluated by the NMFS. Such consultation could result in modification of the existing Biological Opinion. Given the result of this consultation is unknown, this significant impact is considered to be unmitigable at this time. (See also water supply related impacts under Groundwater.)	Significant
Maximum Flow Percent Inflow State Permit	Violate state temperature objectives established for the Trinity River.	Significant impacts identified for violation of state temperature objectives would be evaluated by the NCRWQCB. Consultation with NMFS would occur pursuant to Trinity River coho salmon. Bypassing the Trinity Powerplant could offset impacts to temperature in the Trinity River. Preliminary analysis of powerplant bypasses indicates that pulling colder water from lower in the reservoir could alleviate temperature impacts. Further evaluation of the benefits and costs would be needed before a full assessment could be made. Given the result of consultations and bypass analysis is unknown, this significant impact is considered to be unmitigable at this time.	Significant
		Fishery Resources	
Native Anadromous Species			
State Permit	Would affect native anadromous species	Anticipated significant impacts to native anadromous salmonids in the Trinity	Significant

TABLE ES-4
Summary of Significant Adverse Environmental Impacts and Proposed Mitigation

DEIS/EIR Action Alternative	Description of Significant Impact	Mitigation	Level of Significance after Mitigation
	utilizing the Trinity River due to inadequate habitat conditions and water temperature.	River from implementation of this alternative would be unmitigatable.	
Maximum Flow Flow Evaluation Percent Inflow	Violate temperature objectives and carryover storage criteria established in the Sacramento River winter run chinook salmon Biological Opinion.	(See mitigation for water quality related impacts under Water Quality.) Consult with NMFS and implement any required conservation measures. Given the result of this consultation is unknown, this significant impacts is considered to be unmitigable at this time.	Significant
Resident Native and Non-native Fish			
State Permit	Increased water temperatures, which would reduce non-native Trinity River fish habitat.	Anticipated significant impacts to resident fish in the Trinity River from implementation of this alternative would be unmitigatable.	Significant
Maximum Flow Flow Evaluation Percent Inflow	Impacts to Delta smelt and Sacramento splittail as a result of changes in Delta inflow to export ratios.	Consult with Service and implement any required conservation measures. Given the result of this consultation is unknown, this significant impact is considered to be unmitigable at this time.	Significant
Reservoirs			
Maximum Flow	Impacts to largemouth and smallmouth bass spawning in Trinity Reservoir due to reduced water surface levels.	A smallmouth and largemouth bass stocking program shall be instituted similar to the existing stocking program for coldwater species.	Less than significant
Ocean Fisheries Economics			
State Permit	Reduced angler benefits and net income of charter boat operators in the Mendocino Region.	No mitigation is available.	N/A
State Permit	Reduced commercial fishing harvests and related economic benefits.	No mitigation is available.	N/A
	Tribal Trust		
State Permit	Reduced flows would lead to further decline in tribal access to trust resources.	No mitigation is available.	Significant
	Vegetation, Wildlife, and Wetlands		
Vegetation			
Maximum Flow	Ground disturbing activities could result	Conduct site-specific environmental reviews prior to mechanical ground-	Less than significant

TABLE ES-4
Summary of Significant Adverse Environmental Impacts and Proposed Mitigation

DEIS/EIR Action Alternative	Description of Significant Impact	Mitigation	Level of Significance after Mitigation
Flow Evaluation Percent Inflow Mechanical Restoration	in a loss of vegetation and special-status plant populations.	disturbing activities. Such reviews shall, when appropriate, include surveys for federal and state endangered, threatened, and proposed species, or for other species if required by permitting agencies (e.g., USFS). If such species are present, actions shall be taken to avoid impacts. Develop and implement a revegetation plan for all ground-disturbing activities (excluding channel rehabilitation sites). Revegetation shall use plant species found adjacent to the impact area or from similar habitats, subject to land-owner and/or agency concurrence. Replacement ratios and monitoring plans, if determined necessary, will be developed in cooperation with the Corps, Service, and CDFG.	
State Permit	Further degradation of riparian vegetation due to reduced flows.	No mitigation is available.	Significant
Wildlife			
Flow Evaluation Percent Inflow Mechanical Restoration	Direct mortality of foothill yellow-legged frogs or egg masses, adult western pond turtles and hatchlings, or willow flycatcher nests and young during construction (and maintenance for the Mechanical Restoration) of the channel rehabilitation sites.	Conduct site-specific environmental reviews prior to mechanical ground-disturbing activities. Such reviews shall, when appropriate, include surveys for federal and state endangered, threatened, and proposed species, or for other species if required by permitting agencies (e.g., USFS). If such species are present, actions shall be taken to avoid impacts (e.g., delay construction until after willow flycatcher chicks fledge).	Less than significant
State Permit	Continued degradation and reduction of habitat as a result of reduced flows.	No mitigation is available.	Significant
Wetlands			
Flow Evaluation Percent Inflow Mechanical Restoration	The mechanical channel rehabilitation projects could impact wetland resources.	Conduct pre-construction delineation of wetland areas at sites that may contain wetlands. Consult with the Corps on potential impacts to wetland resources. No mitigation is available.	Less than significant
		Recreation	
Riverine			
Maximum Flow Flow Evaluation Mechanical Restoration State Permit	Impacts from flows to a number of recreation activities for at least a portion of the recreation season.	Flow-related significant impacts would be unmitigable without changing the flow release schedule which is inherent to the alternative.	Significant

TABLE ES-4
Summary of Significant Adverse Environmental Impacts and Proposed Mitigation

DEIS/EIR Action Alternative	Description of Significant Impact	Mitigation	Level of Significance after Mitigation
Percent Inflow			
Maximum Flow Flow Evaluation State Permit Percent Inflow	Impacts to public safety from river flows that are too high or too low (i.e., outside the preferred range for boating).	Post signs at river access points showing daily flows. Offer a toll-free telephone number so recreationalists can call to obtain daily flow information. Post daily flows on the Internet.	Less than significant
Maximum Flow Flow Evaluation Percent Inflow Mechanical Restoration	Impacts to recreation activities from turbidity associated with the construction (and maintenance for Mechanical Restoration) of the channel rehabilitation sites.	(See mitigation for water quality related impacts under Water Quality.)	Less than significant
Reservoirs			
Maximum Flow Flow Evaluation	Increase the frequency at which Trinity Reservoir boat ramps are unusable, which would indirectly impact marinas and campgrounds.	All affected boat ramps should be extended a sufficient distance to accommodate the new water levels. Marina owners should be compensated for additional costs associated with moving their facilities or to construct new facilities to accommodate the new water levels. Campground facilities should be modified or funding provided to accommodate the revised operational approach.	Less than significant
		Land Use	
Residential/Municipal and Industrial			
Maximum Flow Flow Evaluation Percent Inflow	Increased flooding of Trinity River structures and/or residences.	Property owners could be compensated at fair market value for all flood-related structure/improvement losses incurred, or funding would be provided to retrofit structures/improvements to withstand peak flows. Property owners who have parcels with buildable sites outside of the current 100-year floodplain that would be regularly inundated could be compensated at fair market value for the loss of development rights to that parcel. Given funding for these efforts is not yet been determined, this significant impact is considered to be unmitigable at this time.	Significant
Maximum Flow	Potentially significant M&I related impacts as a result of decreased surface-water supplies.	(See water supply related impacts under Groundwater.)	Significant

TABLE ES-4
Summary of Significant Adverse Environmental Impacts and Proposed Mitigation

DEIS/EIR Action Alternative	Description of Significant Impact	Mitigation	Level of Significance after Mitigation
Agriculture			
Maximum Flow Flow Evaluation	Substantially decrease irrigated acreage within the San Felipe Unit.	(See water supply related impacts under Groundwater.)	Significant
		Power	
Maximum Flow Flow Evaluation Percent Inflow	Potentially significant power-related impacts from decreased surface-water supplies.	(See water supply related impacts under Groundwater.)	Significant
		Cultural Resources	
Maximum Flow Flow Evaluation Percent Inflow Mechanical Restoration	Impacts to cultural resources.	Conduct cultural resource surveys of project areas (including areas of ancillary activities, such as staging areas, gravel mining areas, etc.) prior to ground disturbance. Areas containing cultural resources shall be demarcated and activities planned to avoid these areas. If cultural resources cannot be avoided, additional research or test excavations (as appropriate) will be undertaken to determine whether the resources meet CEQA and/or NRHP significance criteria. Unavoidable impacts on significant resources would be mitigated for in a manner that is deemed appropriate. Mitigation for significant resources may include, but is not limited to, data recovery, public interpretation, performance of a Historic American Building Survey or Historic American Engineering Record, or preservation by other means.	Less than significant
		Air Quality	
Maximum Flow Flow Evaluation Percent Inflow Mechanical Restoration	Spawning gravel placement and other heavy equipment work associated with the alternatives would result in potentially significant PM_{10} impacts as a result of fugitive dust.	Implement a dust control program, which includes: watering of stockpiles, roads, etc. as necessary, and identify an individual to monitor dust control and to respond to citizen complaints.	Less than significant

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