3.10 Power Resources

The TRD is a key component of CVP hydropower as it provides approximately 30 percent of the power generation capability of the CVP. Potential impacts to power resources focus on effects to power generation, market value of power, and ***preference power customers***. Unlike other impact analyses in this DEIS/EIR, this section does not differentiate between the Trinity River Basin, Lower Klamath River Basin/Coastal Area, and Central Valley because impacts to power span the Trinity River Basin and Central Valley areas and beyond.

The TRD is a key component of CVP hydropower as it provides approximately 30 percent of the power generation capability of the CVP.

Affected Environment.

Hydroelectric Operations and Generation Facilities. Western operates, maintains, and upgrades the transmission grid that was constructed by the CVP. Hydroelectric generation facilities were constructed as part of 11 CVP water supply facilities (Figure 3-45). Hydroelectric generation facilities include the turbines, generators, and powerplant substations and switchyards used to generate electricity and deliver it to a transmission system. CVP hydroelectric facilities have an installed generation capability of approximately 2,000 MW (Table 3-47).

Western dispatches and markets CVP power to preference power customers. Preference power customers are entities such as municipalities and irrigation districts that are specifically entitled to preference under Reclamation law (see the glossary for definition of Reclamation law). Western is also responsible for meeting all project use load, which is the power required to operate CVP facilities. Although developed primarily for irrigation, this multiple-purpose project also provides flood control, improves Sacramento River navigation, supplies domestic and industrial water, generates electric power, conserves fish and wildlife, creates opportunities for recreation, and enhances water supply. Although the generation of power is not a primary operational objective, it is nonetheless a major economic benefit of CVP operations and, accordingly, affects project operations.

Among the CVP facilities, the TRD is a key component of the overall generation capability. The TRD, including the Trinity Powerplant, is efficient in terms of energy production, generating 1,100 kWh more per af of water than the Shasta Powerplant—(the largest powerplant in the CVP). Efficiency of the TRD is approximately three to four times that of Shasta or New Melones Plants, and almost five times that of the Folsom Powerplant. The TRD is a peak power resource. Its power is dedicated first to meeting the requirements of CVP facilities. The remaining energy is marketed to various preference customers in Northern California.

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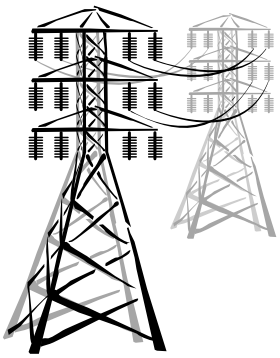
TABLE 3-47
Hydroelectric Generation Facilities

CVP Division	Powerplant	Location	Generating Units	Capability (kW)
Trinity River	Trinity	Trinity Dam/ Trinity River	2	139,650
	Lewiston	Lewiston Dam/ Trinity River	1	350
	J.F. Carr	Whiskeytown Dam	2	157,000
	Spring Creek	Spring Creek Power Conduit	2	200,000
Shasta	Shasta	Shasta Dam/ Sacramento River	7 [a]	625,000 [b]
	Keswick	Keswick Dam/ Sacramento River	3	105,000
American River	Folsom	Folsom Dam/ American River	3	215,000
	Nimbus	Nimbus Dam/ American River	2	14,900
Delta	San Luis	San Luis Reservoir	8 (total)	202,000 (CVP share) (424,000 total)
	O'Neill	San Luis Canal	6	29,000
East Side	New Melones	New Melones Dam/Stanislaus River	2	383,000
Total Capability				**2,070,900**

[a] Includes two station service units.
[b] Installed capacity after all rewinds are complete in year 2000.

Power Resources



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The TRD includes the Trinity, Lewiston, J.F. Carr, and Spring Creek Powerplants. Water from Trinity Dam flows through the Trinity Powerplant into Lewiston Reservoir. The majority of this water is then exported to the Central Valley where it passes through the Clear Creek Tunnel and the J.F. Carr Powerplant before entering Whiskeytown Reservoir. Water released from Whiskeytown Reservoir flows to Clear Creek, the Clear Creek South Unit (owned by the City of Redding), or to Keswick Reservoir through the Spring Creek Power Conduit and Spring Creek Powerplant.

Water released through Lewiston Dam generates power at the Lewiston Powerplant. This power is used for station service and the TRSSH; the remaining power is delivered to the Pacific Gas and Electric (PG&E) power grid.

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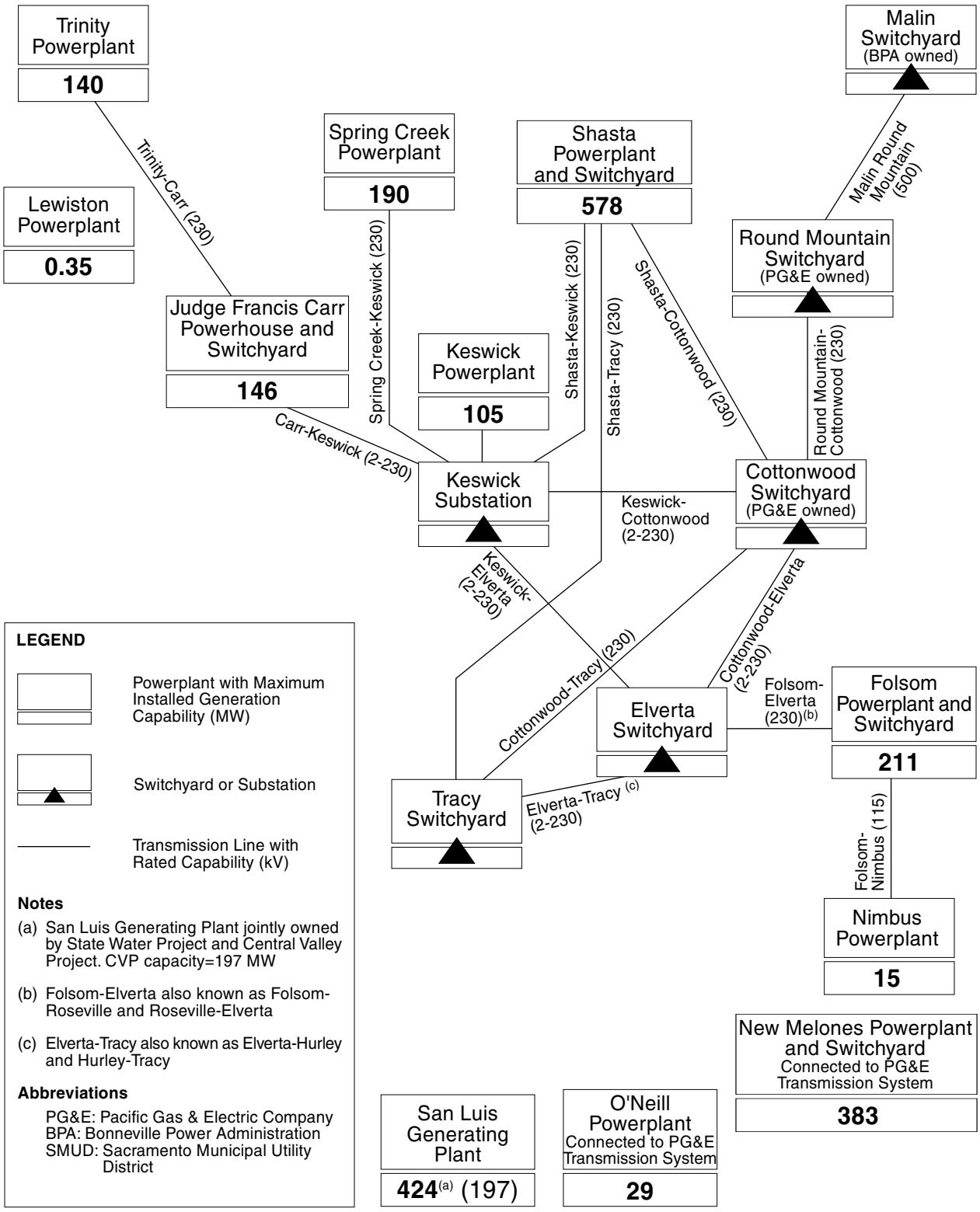

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FIGURE 3-45
CVP POWER GENERATION FACILITIES AND ASSOCIATED TRANSMISSION FACILITIES
TRINITY RIVER MAINSTEM FISHERY RESTORATION EIS/EIR

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Power Generation and Purchase. Power generation from CVP facilities fluctuates with reservoir releases and storage levels. Climatic conditions such as drought or wet conditions are the primary factors affecting releases and storage, and the associated ability to generate power. For example, recent dry periods reduced the water level in the New Melones Reservoir to below the minimum power-pool levels, resulting in no power being generated at the facility from August through January in 1991 and August through January in 1992. Reservoir releases are also affected by mandated minimum streamflow requirements, flow fluctuation restrictions, water delivery contracts, and water quality requirements. For example, the Biological Opinion on Sacramento River winter chinook salmon has required Reclamation to release cold water from Shasta Dam outlets that bypass the powerplants. The Biological Opinion has also increased the winter and spring water releases into the Sacramento River, thereby resulting in less water being available for release in the summer, when power needs are highest (the recent installation of the Shasta TCD has essentially eliminated the need to bypass the powerplants at Shasta Dam). These factors have resulted in actual generation typically being less than full capability.

(Recent water quality requirements have) increased the winter and spring water releases into the Sacramento River, thereby resulting in less water being available for release in the summer, when power needs are highest.

Peak power loads typically occur in summer months when water conveyance, groundwater pumping, industrial loads, and air conditioning loads are greatest. In the past, CVP generation has been integrated with other power generation resources operated by PG&E to meet project use load and CVP preference power customer loads. The integration of CVP and PG&E generation is subject to a contract signed by DOI and PG&E – referred to as Contract 2948-A. In recent years this integration has also been affected by changes in the power supply industry. Contract 2948-A will expire after 2004 and will not be renewed. Future project power operations will be based on project use loads and CVP preference power customer loads. Currently, project use loads account for about 30 percent of the energy generated by the CVP. Maximum project use loads in federal fiscal year 1995 totaled approximately 470 MW. During droughts and other times of low CVP generation, Western has exchanged or banked power with PG&E and purchased power from other entities (particularly those in the Pacific Northwest) to meet demands.

During droughts and other times of low CVP generation, Western has exchanged or banked power with PG&E and purchased power from other entities to meet demands.

Reclamation, Western, and PG&E work together on a daily basis, comparing hydropower availability, total loads (including PG&E loads), and availability of PG&E resources and transmission capabilities. Daily operations are scheduled one day prior to actual use when the Reclamation dispatch center determines the necessary releases from Keswick, Lewiston, Tulloch, and Nimbus Reservoirs to meet hourly streamflows, water demands, water quality requirements, and generation needs. Reclamation communicates the dam

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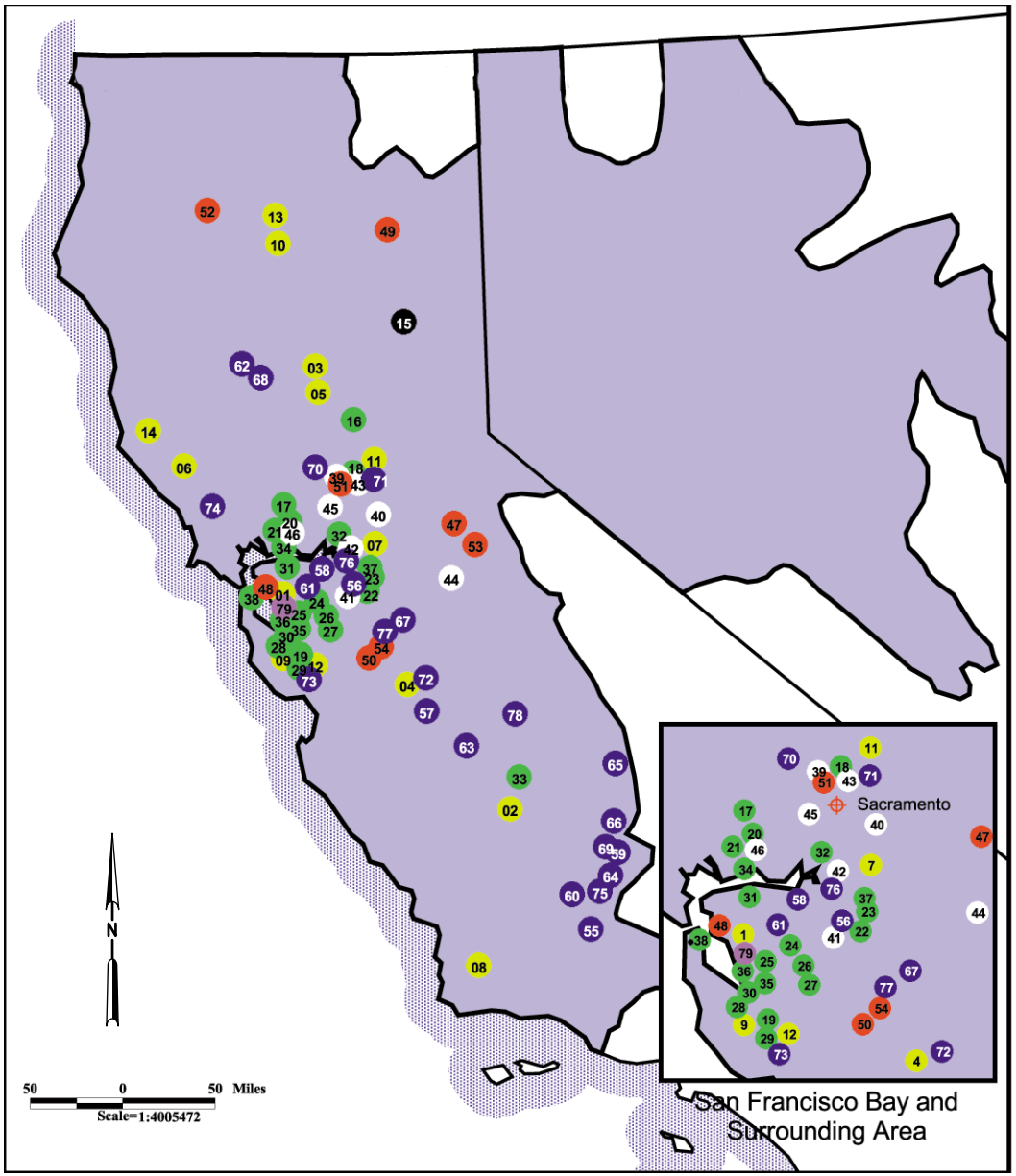
releases to Western's Folsom dispatch office, which coordinates with the PG&E dispatch center. The three entities confirm and, if necessary, adjust the schedule.

Preference Power. CVP power generation was initially intended to supply electricity for the power consuming portions of the CVP (e.g., Delta export pumps, aqueducts, etc.). Power consumption by the CVP is referred to as project use. The Reclamation Act of 1939 provided for surplus power, which is power not needed for project use loads, to be sold first to preference power customers. Current Western preference power customers (in the Sierra Nevada Customer Service Region: see Figure 3-46) include irrigation and reclamation districts, cooperatives, public utility districts, municipalities, state and federal agencies, and other public bodies. Power surplus to preference power customer needs may be sold, if available, to non-preference power customers on a non-firm or short-term basis.

Currently, there are 77 CVP preference power customers (see Table 3-48). The five preference power customers with the largest energy purchases in federal fiscal year 1995 were the Sacramento Municipal Utility District and the cities of Santa Clara, Palo Alto, Redding, and Roseville. In 1995, these customers purchased 52 percent of the total energy sold and paid 55.2 percent of Western's total revenues. Western power is typically a low-cost component of customers' overall resource mix. Other sources of electricity are typically more expensive. The concept of "first preference," that customers could have priority consideration for contracts to purchase power generated at specific plants, was added for Trinity County by the 1955 act authorizing the TRD, and for Tuolumne and Calaveras Counties by the Flood Control Act of 1962. By law, 25 percent of the energy resulting from power generated by the TRD must first be offered to preference power customers in Trinity County. Currently, the Trinity County Public Utility District, located in Weaverville, is a preference power customer falling under the first preference criterion for the TRD generation.

Current Power Marketing. The value of CVP hydropower available for sale is determined by the market. Although the value and annual project output can fluctuate, Western's costs remain essentially unchanged. This causes Western's per-unit cost of electricity to vary. When long-term average generation decreases, Western's customers receive less electricity and are required to pay a higher per-unit cost. If Western rates are relatively low, Western customers are likely to continue to purchase power from Western as part of their long-term resource mix. For planning purposes, power customers evaluate capacity resources based on dry conditions in order to ensure reliability.



MUNICIPALITIES
01. City of Alameda
02. City of Avenal
03. City of Biggs
04. Castle Joint Powers Authority *
05. City of Gridley
06. City of Healdsburg
07. City of Lodi
08. City of Lompoc
09. City of Palo Alto
10. City of Redding
11. City of Roseville
12. City of Santa Clara
13. City of Shasta Lake
14. City of Ukiah

RURAL ELECTRIC COOPERATIVES
15. Plumas-Sierra

FEDERAL AGENCIES

DEPARTMENT OF THE AIR FORCE
16. Beale AFB
17. David Grant Medical Center (Travis AFB)
18. McClellan AFB
19. Onizuka AFB
20. Travis AFB
21. Travis Wherry Housing (Travis AFB)

DEFENSE LOGISTICS AGENCY
22. Defense Distribution Depot (Sharpe Facility)
23. Defense Distribution Depot (Tracy Facility)
24. Parks Reserve Forces Training Area, Dublin

DEPARTMENT OF ENERGY
25. Lawrence Berkeley National Laboratory
26. Lawrence Livermore National Laboratory
27. Site 300
28. Stanford Linear Accelerator Center

NATIONAL AERONAUTICS & SPACE ADMIN.
29. Ames Research Center
30. Moffet Federal Airfield *

DEPARTMENT OF THE NAVY
31. Concord Naval Weapons Station
32. Dixon Naval Radio Station
33. Lemoore Naval Air Station
34. Mare Island Naval Shipyard
35. Oakland Army Base
36. Oakland Naval Supply Center
37. Stockton Naval Communications Station
38. Treasure Island Naval Station

STATE AGENCIES
39. California State Prison-Sacramento
40. California State University, Sacramento-Nimbus
41. Deuel Vocational Institution
42. Northern California Youth Center
43. Parks & Recreation, American River District
44. Sierra Conservation Center
45. University of California, Davis
46. Vacaville Medical Facility

PUBLIC UTILITY DISTRICTS
47. Calaveras Public Power Agency
48. East Bay Municipal Utility District
49. Lassen Municipal Utility District
50. Modesto Irrigation District
51. Sacramento Municipal Utility District
52. Trinity County Public Utilities District
53. Tuolumne Public Power Agency
54. Turlock Irrigation Distrtict

IRRIGATION & WATER DISTRICTS
55. Arvin-Edison Water Storage District
56. Banta-Carbona Irrigation District
57. Broadview Water District
58. Byron-Bethany Irrigation District
59. Cawelo Water District
60. Delano-Earlimart Irrigation District
61. East Contra Costa Irrigation District
62. Glenn-Colusa Irrigation District
63. James Irrigation District
64. Kern-Tulare Water District
65. Lindsay-Strathmore Irrigation District
66. Lower Tule River Irrigation District
67. Patterson Water District
68. Provident Irrigation District
69. Rag Gulch Water District
70. Reclamation District 2035
71. San Juan Water District
72. San Luis Water District
73. Santa Clara Valley Water District
74. Sonoma County Water Agency
75. Terra Bella Irrigation District
76. West Side Irrigation District
77. West Stanislaus Irrigation District
78. Westlands Water District

LOCAL & SUBURBAN PASSENGER TRANSPORTATION
79. Bay Area Rapid Transit District

* NDA Act Economic Development Allocations

Sierra Nevada Regional Office Marketing Area

FIGURE 3-46
WESTERN AREA POWER ADMINISTRATION, SIERRA NEVADA REGION, MARKETING AREA
TRINITY RIVER MAINSTEM FISHERY RESTORATION EIS/EIR

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Reductions in reliable Western power are likely to be offset by more expensive power from other sources.

Reductions in reliable Western power are likely to be offset by more expensive power from other sources.

TABLE 3-48
Western Customers by Agency and Sub-agency Type and Associated Firm Power

Customers by Agency and Sub-agency Types	Long-term Firm (Kw)
Federal Agencies	
Air Force, U.S. Department of	
Beale Air Force Base	20,507
David Grant Medical Facility, Travis	3,552
McClellan Air Force Base	10,655
Onizuka Air Force Base	3,500
Travis Air Force Base	11,299
Travis Wherry Housing (Air Force Base)	100
Category Total:	**49,613**
Defense Logistics Agency	
Parks Reserve Forces Training Area	500
Sharpe Facility	4,000
Tracy Defense Distribution Depot	3,800
Category Total:	**8,300**
Energy, U.S. Department of	
DOE/Lawrence Livermore/Site 300	2,000
DOE/Lawrence Berkeley National Laboratory	9,000
DOE/Lawrence Livermore National Laboratory	23,897
DOE/Stanford Linear Accelerator Center	12,903
Category Total:	**47,800**
National Aeronautics and Space Administration	
Ames Research Center	80,000
Moffett Federal Airfield	3,984
Category Total:	**83,984**
Navy, U.S. Department of	
Naval Air Station, Lemoore	21,869
Naval Communications Station, Stockton	2,943
Naval Radio Station, Dixon	915
Naval Weapons Station, Concord	2,687
Oakland Army Base	2,275
Category Total:	**30,689**
State Agencies	
Department Of Corrections	
California Medical Facility, Vacaville	1,800
California State Prison, Sacramento	2,300
Deuel Vocational Institution	1,700
Northern California Youth Center	2,200
Sierra Conservation Center	3,000
Category Total:	**11,000**
Department of Parks and Recreation	
California State Parks & Recreation, Folsom	100

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Category Total:	**100**
State Universities	
CSUS Nimbus	40
University Of California, Davis	21,500
Category Total:	**21,540**
Municipalities	
Alameda, City of	21,145
Avenal, City of	622
Biggs, City of	1,300
Gridley, City of	4,200
Healdsburg, City of	1,490
Lodi, City of	5,173
Lompoc, City of	2,042
Oakland, Port of	745
Palo Alto, City of	171,200
Redding, City of	91,000
Roseville, City of	69,000
San Francisco, City & County of	2,012
Shasta Lake, City of	11,450
Silicon Valley Power	73,000
Ukiah, City of	4,917
Category Total	**459,296**
Public Utility Districts	
Calaveras Public Power Agency	8,000
East Bay Municipal Utility District	3,914
Lassen Municipal Utility District	23,500
Modesto Irrigation District	4,845
Sacramento Municipal Utility District	361,000
Trinity County PUD	17,000
Tuolumne Public Power Agency	8,000
Turlock Irrigation District	2,190
Category Total:	**428,449**
Rural Electric Cooperatives	
Plumas-Sierra Rural Electric Cooperative	17,900
Category Total:	**17,900**
Irrigation and Water Districts	
Arvin-Edison Water Storage District	30,000
Banta-Carbona Irrigation District	3,700
Broadview Water District	500
Byron-Bethany Irrigation District	2,200
Cawelo Water District	3,500
East Contra Costa Irrigation District	2,000
East Contra Costa Irrigation District	500
Eastside Power Authority	1,914
Glenn-Colusa Irrigation District	3,343
James Irrigation District	638
Kern-Tulare Water District	638
Lower Tule River Irrigation District	914

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Patterson Water District	2,000
Provident/Princeton Irrigation District	750
Rag Gulch Water District	500
Reclamation District 2035	1,600
San Juan Water District	1,000
San Luis Water District (Fittje)	3,250
San Luis Water District (Kalijian)	3,400
Santa Clara Valley Water District	638
Sonoma County Water Agency	6,000
West Side Irrigation District	2,000
West Stanislaus Irrigation District	5,200
Westlands Water District	16,391
Westlands Water District 6-1	1,850
Westlands Water District 7-1	3,200
Category Total:	**97,626**
Railroads and Railways	
Bay Area Rapid Transit District	4,000
Category Total:	**4,000**
Economic Development	
Merced Irrigation District	3,724
Pittsburg Power Company	3,869
Category Total:	**7,593**
Grand Total:	**1,267,890**

Western has wide discretion within its statutory guidelines regarding who and on what terms it will contract for the sale of federal power. The sale of excess power is conducted so as not to impair the efficiency of CVP irrigation deliveries. Contract 2948-A allows for the sale, interchange, and transmission of electrical power and energy between the federal government and PG&E. The agreement allows PG&E to provide energy and capacity as required to meet project use and preference power customer loads; in return, the CVP generating units provide energy and capacity for integration with other PG&E resources. The agreement also recognizes the federal government's 400 MW entitlement on the Pacific Northwest/Pacific Southwest Intertie (Pacific Intertie).

Under the terms of Contract 2948-A, Western delivers the generation of CVP powerplants to PG&E, along with its wholesale purchases; and PG&E supports firm power deliveries to the preference power customers up to a maximum simultaneous demand of 1,152 MW. Western also purchases additional power to support the CVP marketing program and primarily imports it through use of Western's share of the Pacific Intertie and the California-Oregon Transmission Project (COTP).

Environmental Consequences.

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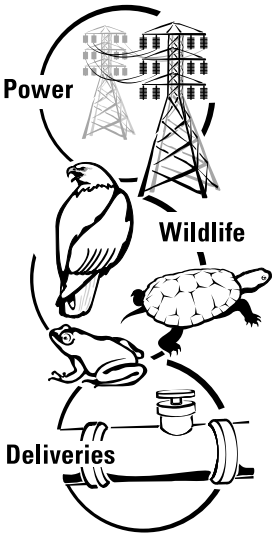
CVP Authorized Purposes



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Methodology. For the purposes of this DEIS/EIR, it was assumed that the CVP would be operated to meet authorized project purposes, which include providing water deliveries to water users, meeting fish and wildlife needs, and generating power. Within given operating constraints, the CVP would be operated to best meet load requirements of the CVP project use load and preference power customers. Additionally, assumptions were made to estimate anticipated conditions once Western fully implements its 2004 Power Marketing Program.

Two computer models were used to evaluate changes to power production: PROSIM and PROSYM. The PROSIM power module estimates the monthly generation, capacity, and project use anticipated over the modeled period 1922-1990. PROSIM output is presented as the amount of generation and capacity over the average (1922-1990), dry (1928-1934), and wet (1967-1971) periods.

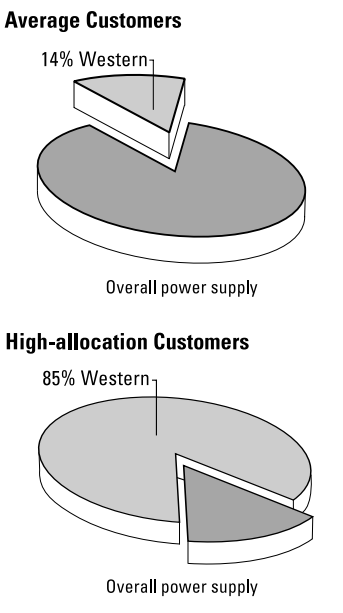
The electric production cost model, PROSYM, uses the output from the PROSIM power module to estimate the annual change in the market value of CVP power production (compared to the No Action Alternative). PROSYM provides results for the average condition over the 69 years of record (similar to the average condition under PROSIM). In addition, PROSYM results are presented for a synthetic dry year. A synthetic dry year is comprised of months that have a modeled level of generation that is exceeded 90 percent of the hydrologic records for that month. For example, January in the synthetic dry year has generation that is exceeded in 90 percent of the 69 Januarys. Synthetic dry years correlate with dry water years, except that the synthetic dry year is a composite of months with relatively low generation.

PROSYM is used to calculate the load-carrying capability available in the synthetic dry year. Load-carrying capability, also referred to as "capacity supported by energy," is the maximum rate of sustainable energy production given flow constraints (e.g., minimum instream releases, water quality constraints) that efficiently supplies electricity to meet system demands. In contrast, PROSIM capacity is calculated as instantaneous generation given the elevation of water behind the powerplant.

The value of energy produced by the CVP was estimated using a marginal unit efficiency approach, meaning that as low-cost resources are decreased, higher-cost resources are brought on-line as they become economically viable. Value was assigned to generation based on the month and time of day in order to assess on-peak and off-peak generation.

For the purposes of assessing impacts, Western's preference power customers were categorized into two groups: average customers,

Western's Preference Power Customers



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defined as customers using Western power for approximately 14 percent of their overall power supply; and high-allocation customers, defined as customers using Western supplies for approximately 85 percent of their power supplies. Additionally, because of its status as a preference power customer with first preference status, PROSYM cost effects were also assessed for Trinity County.

Significance Criteria. Alternatives were analyzed for their impacts on hydropower generation, reliability, and preference power customers. Long-term reductions in generation and reliability could require individual customers to either purchase additional power through the open power markets or construct new power facilities. Given the evolving nature of the power market under recent deregulation statutes and regulations, and in light of the complexity of the grid on which power is wheeled amongst various locations in the western United States, it is impossible to predict where replacement power would come from. Because natural gas plants are increasingly an economic and relatively clean source of fossil fuel power, it seems likely that elimination of some power from the TRD system would result in greater natural gas power generation somewhere in the western United States, for ultimate consumption in California. It is therefore likely that air pollution from natural gas power generation would increase to a degree. The location of the resulting emissions, however, is impossible to predict. The power plants at issue would be subject to increasingly stringent air quality laws, such as the Clean Air Act; and the power plants themselves would be required to operate pursuant to the terms of their permits, which necessarily require some level of pollution reduction.

Long-term reductions in generation and reliability could require individual customers to either purchase additional power through the open power markets or construct new power facilities.

In order to assess the severity of the impacts, the following significance criteria were developed:

- A 50 MW reduction in synthetic dry-year capability available for sale to preference power customers in January, February, March, June, July, August, September, or December (the months typically most sensitive to reduced capacity). Capability is defined as the amount of CVP capacity that can be sustained (given flow constraints) that efficiently supplies electricity to meet demands.
- A reduction of 5 percent or more in the annual energy available for sale to preference power customers over the modeled period.
- A reduction of 5 percent or more in the average energy available for sale to preference power customers during any month over the modeled period.
- Any decrease in CVP power that results in an increase in either an average preference power customer or a high-allocation

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preference power customer's average power cost by $0.50 per megawatt-hour (MWh).

No Action. Under the No Action Alternative, the CVP power generation facilities would be operated in a manner similar to the operations discussed under the Affected Environment and consistent with the criteria defined in the 1992 CVP-OCAP. Predicted power generation, as modeled by PROSIM and PROSYM, is presented in Table 3-49 at the end of this section.

Under this alternative, Trinity County would maintain its current Contract Rate of Delivery.

Maximum Flow. Reductions in power generation under the Maximum Flow Alternative reflect the elimination of Trinity River diversions to the Sacramento River. The alternative would substantially reduce the amount of electricity generated by the TRD.

PROSYM output identified several significant impacts resulting from the alternative. Compared to No Action, dry-year firm load-carrying capability would be reduced by 50 MW or more in March, June, July, August, September, and December of the synthetic dry year, largely due to the elimination of generation at the J.F. Carr Powerhouse and reduction of generation at Spring Creek Power Plant. Likewise, in the synthetic average year, energy available for sale would be reduced by 24 percent compared to No Action. Energy available for sale in synthetic average months would be reduced by more than 5 percent in 9 out of 12 months compared to No Action. The reduction in net energy available for sale is offset somewhat by a reduction in project use in both the synthetic average and dry years.

The net decrease in the value of CVP power production is estimated to be $26,036,000 annually, which represents a 15 percent decrease compared to No Action. Average-allocation preference power customers would be subject to significant increases of $0.96/MWh for their average cost of power compared to No Action. High-allocation customers would be subject to significant increases of $5.86/MWh compared to No Action.

Trinity County power costs would increase $321,000 annually compared to No Action.

Flow Evaluation. Average annual CVP power generation under this alternative would be reduced in the Trinity Division; slightly reduced in the Shasta Division; and remain approximately the same at Folsom, Nimbus, and San Luis Powerplants. This alternative includes a shift in the timing of diversion to the Sacramento Valley from spring to summer (when power demand is greater). The increase in on-peak power generation is complemented by a reduction in project use, thereby increasing the amount of electricity

available for sale (Table 3-49). The reduction in project use is partially attributed to reduced water exports from the Bay-Delta, which reduces the amount of electricity required for operating the pumps and aqueduct.

PROSYM output identified several significant impacts of the Flow Evaluation Alternative. Compared to No Action, dry-year firm load-carrying capability would be reduced by 50 MW or more in December of the synthetic dry year, largely due to increases in project use. In the synthetic average year, energy available for sale would be reduced by 7 percent compared to No Action. Energy available for sale in synthetic average months would be reduced by more than 5 percent in 7 out of 12 months. The reduction in net energy available for sale is offset somewhat by a reduction in project use in the synthetic average year. The net decrease in the value of CVP power production is estimated to be $5,564,000 annually, which represents a 3.2 percent decrease compared to No Action. High-allocation customers would be subject to increases of $1.25/MWh in average power cost compared to No Action.

Trinity County power costs would increase $69,000 annually compared to No Action.

Percent Inflow. This alternative would make less water available for power generation in extremely wet, wet, and normal water-year classes, and more water available for power generation in dry and critically dry-year classes. On average, less water would be available for power generation. Furthermore, diversion patterns under this alternative generate more power in the relatively low-value off-peak season. Lower-value power is compounded by an increase in project use in the synthetic dry year, resulting in less power available for use by preference power customers in the high-value season. Compared to the No Action Alternative, average annual CVP power generation would be reduced in the TRD and remain approximately the same elsewhere in the CVP (Table 3-49).

PROSYM output identified several significant impacts of the Percent Inflow Alternative. Compared to No Action, dry-year firm load-carrying capability would be reduced by 50 MW or more in February and June of the synthetic dry year, largely due to increases in project use during February and decreased load-carrying capability during June. Energy available for sale in synthetic average months would be reduced by more than 5 percent in 5 out of 12 months compared to No Action. The net decrease in the value of CVP power production is estimated to be $7,023,000 annually, which represents a 4 percent decrease compared to No Action. High-allocation customers would be subject to increases of $1.58/MWh in average power cost compared to No Action.

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Trinity County power costs would increase $87,000 annually compared to No Action.

Mechanical Restoration. Impacts would be the same as the No Action Alternative.

State Permit. The State Permit Alternative would increase the amount of water available for use in power generation.

The alternative would generate more power and would create more power available for sale to customers than the No Action Alternative (Table 3-49). This would result in benefits to preference power customers in the form of lower power costs and more reliable power supplies.

Under the existing conditions scenario, Western, or its customers, would be required to purchase additional capacity to meet the same demand level as is met in the No Action case.

Existing Conditions versus Preferred Alternative. In general, power operations of the CVP under existing conditions (i.e., 1995) are similar to the No Action Alternative (i.e., 2020). The major difference between the two is the integration of CVP into the PG&E load curve. Under existing conditions, the project is integrated with other PG&E generation pursuant to Contract 2948-A. Under that contract, CVP electricity is dispatched in the overall PG&E load curve so that it runs at a capacity level (rate of energy production) that is generally less than it would be if it were optimized to meet project use and Western preference loads. Since this contract is scheduled to terminate in 2004, the No Action Alternative has been constructed so that the integration with PG&E facilities is no longer assumed. This results in CVP power being dispatched according to the demands of their preference power customers, rather than the PG&E load curve. No Action, therefore, is more efficient at meeting preference power customer demands, resulting in more customer benefits than existing conditions. Under existing conditions, Western, or its customers, would be required to purchase additional capacity to meet the same demand level as is met in the year 2020.

Mitigation. Potentially significant power-related impacts could occur as a result of decreased surface-water supplies associated with the Maximum Flow, Flow Evaluation, and Percent Inflow Alternatives. Although water supply changes per se were not considered an impact, the development of additional water supplies to meet demands would lessen the associated impacts. Conceptually, any additional water supply or demand reduction would free up water for use by other, competing uses. A number of demand- and supply-related programs are currently being studied across California, many of which are being addressed through the on-going CALFED and CVPIA programs and planning processes. Although none of these actions would be directly implemented as part of the alternatives discussed in this DEIR/EIS, 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, the Trinity River Basin, and 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 water 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.
- Develop or construct generation for use by CVP customers.
- Purchase replacement power resources to offset losses of CVP generation.

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TABLE 3-49
Power Resources Summary Table

CVP Operations		No Action	Percent Change from the No Action Alternative					Percent Change from Preferred Alternative	
			Maximum Flow	Flow Evaluation	Percent Inflow	Mechanical Restoration	State Permit	Existing Conditions	Existing Condition Percent Change Compared to Preferred Alternative
Operations									
Capacity (MW)	Average (1922-1999)	1,603	-2%	0%	0%	0%	4%	1,668.50	-4%
	Dry (1928-1934)	1,276	-10%	-2%	1%	0%	11%	1,394.08	-10%
	Wet (1967-1971)	1,766	-2%	0%	0%	0%	0%	1,778.00	-1%
Energy (GWh)[a]	Average (1922-1999)	5,169	-21%	-6%	-3%	0%	4%	5,217.00	-6%
	Dry (1928-1934)	2,946	-25%	-7%	1%	0%	9%	2,985.00	-8%
	Wet (1967-1971)	6,490	-20%	-7%	-5%	0%	3%	6,525.00	-8%
Project Use (GWh)	Average (1922-1999)	1,394	-11%	-2%	0%	0%	1%	1,401.00	-3%
	Dry (1928-1934)	901	-10%	-6%	0%	0%	8%	882.00	-4%
	Wet (1967-1971)	1,502	0%	1%	0%	0%	0%	1,519.00	0%
Power Marketing									
Average Year Energy Available for Sale by Month (GWh)	January	192	-7%	-2%	-3%	0%	6%	201	-6%
	February	212	1%	-1%	-3%	–	6%	222	-6%
	March	235	-1%	-4%	-4%	–	4%	240	-6%
	April	300	-4%	-7%	-1%	–	3%	309	-10%
	May	473	-22%	-10%	-10%	–	3%	474	-10%
	June	541	-27%	-16%	-10%	–	2%	535	-15%
	July	609	-31%	-7%	-6%	–	4%	609	-7%
	August	492	-33%	-2%	2%	–	6%	491	-2%
	September	234	-34%	17%	12%	–	25%	236	-16%
	October	187	-58%	-22%	-10%	–	6%	194	-24%
	November	127	-41%	-13%	-5%	–	8%	131	16%
	December	176	-30%	-8%	-2%	–	7%	182	-10%
	TOTAL	3,779	-24%	-7%	-4%	0%	6%	3,825	-8%
Synthetic Dry-year Firm Load-carrying Capacity (MW)	Capability available for sale	1,229	-16%	3%	-3%	–	-2%	1,167	9%
	Generation-limited months per year with 50 MW reduction	None	6	1	2	–	–	1	–
Cost (or benefits) of Changes in Power Production Based on Value of Replacement Power ($1,000)	Bay Area	40.3%	-$10,493	-$2,242	-$2,830	–	$2,393	1,397	1,397
	Other	4.2%	-$1,093	-$234	-$295	–	$249	146	146
	Sacramento Valley	45.5%	-$11,850	-$2,532	-$3,196	–	$2,702	1,577	1,577
	San Joaquin Valley	8.8%	-$2,280	-$487	-$615	–	$520	303	303
	Trinity County	1.2%	-$321	-$69	-$87	–	$73	43	43
	TOTAL	100.0%	-$26,037	-$5,564	-$7,023	–	$5,937	3,466	3,466
Cost per Unit of Electricity ($/MWh)	Average customer	–	$0.96	$0.21	$0.26	–	-$0.22	-$0.33	$.54
	High-allocation customer	–	$5.86	$1.25	$1.58	–	-$1.34	-$3.90	$5.15

[a]GWh = gigawatt hour.

3.11 Socioeconomics

This section presents regional information on socioeconomic conditions and impacts. As required by NEPA, the impacts of each alternative are compared to the No Action Alternative in the year 2020. Although CEQA does not require any discussion of socioeconomic impacts, this section nevertheless, to be consistent with other sections, compares the impacts of the Preferred Alternative in the year 2020 (Flow Evaluation plus watershed protection work from the Mechanical Restoration Alternative) to existing conditions, i.e., 1995.

This document presents two types of economic analyses, one measuring economic benefits (presented within the fisheries, recreation, and land use sections) and the other regional economic impacts (presented here). Regional economic impacts measure total economic activity within a given region, often using such indicators as output/sales, income, and employment. Regional economic impacts include the sum of direct effects (impacts to initially affected industries), indirect effects (impacts to industries providing inputs to directly impacted industries), and induced effects (impacts from employees spending wages within the region). Conversely, benefits measure economic welfare based on a net value concept. For consumers, economic welfare reflects the value of goods and services consumed above what is actually paid for them (willingness-to-pay [WTP] in excess of cost). For producers or businesses, economic welfare reflects gross revenues minus operating costs (profit).

One way to visualize the difference between impacts and benefits is to consider how each reacts to increases in regional expenditures. Regional economic impacts typically increase as in-region expenditures increase, whereas profitability/net WTP tend to decrease as costs or expenditures increase. While regional benefits and economic impacts often move in unison since they both rise or fall with levels of production, there are many situations where benefits and economic impacts diverge. This potential for divergence, along with the fact that different user groups are often interested in different economic measures, creates a need for both analyses.

For both the benefit and regional impact analyses, results cannot be summed fully into a net effect for each alternative. There are several reasons for this: (1) not all effects have been quantified (e.g., tribal fishing), (2) input data accuracy varies (e.g., fisheries analyses are based on harvest estimates developed solely to compare alternatives), (3) benefit estimates are developed for the year 2020 only, whereas the costs reflect all years, etc. Since it is inappropriate to aggregate benefits and compare them to costs, the only reasonable benefit comparison is within a given economic category. For this reason, the benefits are compared only under each of the appropriate

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resource areas - fisheries, recreation, land use (agriculture, M&I, water), and power. For the regional impacts, the alternative comparison is constrained to impacts across economic categories within a given subregion. It was deemed reasonable to aggregate certain regional impacts across economic categories for the same region since the analyses use the same underlying model, the IMPLAN input-output model[18]. Regional impacts should not be aggregated across regions since the inter-regional relationships have not been addressed. For a more comprehensive discussion of socioeconomics, see the Socioeconomics and Environmental Justice Technical Appendix G.

Affected Environment.

Trinity River Basin. For purposes of the 2020 socioeconomic analyses, the Trinity River Basin is defined as Trinity and Shasta Counties. This is due to the strong linkage of recreation-related spending between the two counties (recreation-related spending impacts specific to Trinity County are also identified). For up-front costs, the region is defined as Trinity County since that is where the costs are incurred. For a more comprehensive discussion of socioeconomics, see the Socioeconomics and Environmental Justice Technical Appendix G.

Current Economic Conditions. Trinity County is rural with substantial amounts of public land. As a result, the region is relatively dependent on tourism and natural resources for its economic base. Since 1990, unemployment within the county has been high, averaging 13.9 percent compared to the statewide average of 7.5 percent. Total industry output and ***place of work income*** in 1992, as obtained from the IMPLAN model, was estimated at $339 and $183 million, respectively (in 1997 dollars[19]). Total 1992 employment was about 4,870 jobs with major employment sectors being government (27.6 percent), services (20.4 percent), wholesale and retail trade (17.2 percent), and manufacturing (12.2 percent) (Table 3-50).

Since 1990, unemployment within the (Trinity County) has been high, averaging 13.9 percent compared to the statewide average of 7.5 percent.

Although much of Shasta County also consists of public lands, the county is considerably more urban than Trinity County because of the City of Redding. Shasta County's unemployment rate since 1990 has averaged nearly 11 percent. Total industry output and place of work income in 1992 was estimated at $5.4 and $3.0 billion, respectively. Total employment in 1992 was estimated at more than 74,000 jobs with major employment sectors including services (27.6 percent), wholesale and retail trade (25.4 percent), and govern-

Shasta County's unemployment rate since 1990 has averaged nearly 11 percent.

[18] For the KMZ-CA subregion, the overall regional impacts would be understated due to lack of consideration of the tribal harvest.

[19] Unless otherwise noted, all monetary values referred to in Section 3.11 were derived using 1997 dollars.

ment (15.6 percent) (Table 3-50). Over 90 percent of the total industry output, place of work income, and jobs in the combined Trinity / Shasta County Region in 1992 occurred in Shasta County.

Based on recent estimates of recreational use of the Trinity River and Trinity, Shasta, and Whiskeytown Reservoirs, it is estimated that approximately $70 million is spent annually in Trinity and Shasta Counties to recreate at these areas. Of this spending, an estimated $13 million is spent in Trinity County, with nonresidents of the county accounting for about 75 percent. Spending associated with recreation at these areas supports 2,100 jobs directly, and indirectly supports an additional 1,500 jobs within the two-county area.

TABLE 3-50
Employment Data for Trinity River Basin

	Trinity County		Shasta County		Trinity & Shasta Counties	
Economic Sectors	**1992 Employment**	**Percent of Total**	**1992 Employment**	**Percent of Total**	**1992 Employment**	**Percent of Total**
Agriculture, forestry, fishing	385	7.8	2,370	3.2	2,755	3.5
Mining	15	.3	210	.3	225	.3
Construction	365	7.5	6,255	8.4	6,620	8.4
Manufacturing	595	12.2	5,625	7.6	6,220	7.9
Transportation; communications; electric, gas, & sanitary services	120	2.5	3,960	5.3	4,080	5.2
Wholesale trade	105	2.1	4,550	6.1	4,655	5.9
Retail trade	735	15.1	14,325	19.3	15,060	19.1
Food stores	185	3.8	2,955	4.0	3,140	4.0
Eating & drinking places	220	4.5	4,540	6.1	4,760	6.0
Auto dealers & service stations	55	1.1	1,575	2.1	1,630	2.1
Finance, insurance, & real estate	185	3.8	4,100	5.5	4,285	5.4
Services	995	20.4	20,475	27.6	21,470	27.2
Lodging	185	3.8	1,185	1.6	1,370	1.7
Government	1,345	27.6	11,580	15.6	12,925	16.4
Other	25	.5	665	.9	690	.9
Total	**4,870**	**100.0**	**74,115**	**100.0**	**78,985**	**100.0**

Source: IMPLAN, 1992.

Current Social Conditions. Trinity County's population slowly increased from 1990 until 1995 when it began to decline. A recent estimate by the U.S. Census Bureau indicates the population dropped from 13,401 people in July 1996, to 13,197 people in July 1997. The decline in the timber industry and attendant loss of jobs is viewed as

The decline in the timber industry and attendant loss of jobs is viewed as one reason for the decline in (Trinity County's) population.

Recreation and tourism—especially that which is water-based—are viewed as important to the (Trinity County) economy.

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one reason for the decline in population. The county has been seeking new businesses. Recreation and tourism—especially that which is water-based—are viewed as important to the local economy.

Flooding along the Trinity River in January of 1997 raised residents' awareness and level of concern about potential flooding. Those living near the river experienced first-hand the physical and emotional impacts of flooding.

The residents of Trinity County value living where they do and their lifestyle, far removed from urban areas. Many have given up higher paying jobs to live in the area. The local public has voiced a desire to have water returned to the Trinity River and kept in Trinity Reservoir. Most believe that perceived adverse impacts to the local area as a result of the TRD will continue.

The Lower Klamath River Basin/Coastal Area region extends from Monterey, California, to approximately the Oregon/Washington border.

Lower Klamath River Basin / Coastal Area. The Lower Klamath River Basin / Coastal Area region extends from Monterey, California, to approximately the Oregon / Washington border (Figure 3-1). This region, which corresponds to the migratory range of Trinity River salmon, includes six subregions: Monterey, San Francisco, Mendocino, KMZ-California, KMZ-Oregon, and Northern / Central Oregon. For purposes of socioeconomic analyses, the lower Klamath River, which extends from the confluence of the Trinity and Klamath Rivers to the mouth of the Klamath, is included in the KMZ-California Coastal Area.

Current Economic Conditions.

Monterey Coastal Area. The Monterey Coastal Area extends from Point Conception to Point San Pedro, California, and includes the counties of San Luis Obispo, Monterey, and Santa Cruz. The region is characterized by both an agricultural and urban economy. Total industrial output in 1992 was valued at $32.4 billion. Place of work income was estimated at $18.3 billion, and approximately 144,200 persons were employed. Major employment sectors included services (26 percent of regional employment), government (19 percent), retail trade (16 percent), and agriculture, forestry, and fishing (12 percent) (Table 3-50).

The (Monterey Coastal Area)…is characterized by both an agricultural and urban economy. The economy…is potentially affected by changes in ocean commercial and sport fishing for salmon.

The economy of the Monterey Coastal Area is potentially affected by changes in ocean commercial and sport fishing for salmon. Employment in the commercial fishing sector totaled 210 jobs in 1992. Commercial fish harvests generated an additional 450 jobs in the seafood processing sector. Together, these two sectors accounted for slightly more than 0.1 percent of the total employment within the area in 1992. In 1996, the area accounted for nearly half of California's commercial salmon harvest, generating an estimated $2.9 million in gross harvest revenue (Pacific Fishery Management Council, 1997).

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Ocean sportfishing for salmon takes place primarily from privately owned pleasure craft or chartered boats. Businesses that benefit from trip-related spending by ocean salmon sport fishers include charter boat operations, retail operations that provide goods to sport fishers (e.g., restaurants, bait and tackle stores), and lodging places. Ocean sportfishing for salmon generates an estimated $4.4 million annually in trip-related spending in the area. Of this spending, nonresidents account for about 50 percent.

San Francisco Coastal Area. The San Francisco Coastal Area extends from Point San Pedro to Point Arena, California, and includes San Francisco, San Mateo, Santa Clara, Alameda, Contra Costa, Marin, and Sonoma Counties. The region is characterized by an urban economy. Total output in 1992 was valued at $360.5 billion. Place of work income was estimated at $202 billion, and approximately 3.5 million persons were employed. Major employment sectors include services (32 percent of regional employment), retail trade (15 percent), government (13 percent), and manufacturing (13 percent) (Table 3-51). Agriculture, forestry, and fisheries sectors account for 1.2 percent of regional employment.

The (San Francisco Coastal Area) is characterized by an urban economy…(and is) potentially affected by changes in ocean commercial and sport fishing for salmon, agricultural production, hydropower generation, and M&I water supply.

The economy of the area is potentially affected by changes in ocean commercial and sport fishing for salmon, agricultural production, hydropower generation, and M&I water supply. Employment in the area's commercial fishing and processing sectors totaled 440 and 530 jobs, respectively. Together, these sectors accounted for less than 0.1 percent of total employment within the area. Commercial salmon harvests in the area have remained relatively constant over the last 25 years, averaging 193,500 salmon harvested per year, even though harvests dropped dramatically in 1992 to 67,000 along the entire West Coast. In 1996, 152,000 salmon were harvested in the area, which resulted in an estimated $2.4 million of gross revenue, or about 42 percent of the California total (Pacific Fishery Management Council, 1997).

About 40 percent of ocean sportfishing for salmon takes place from privately owned pleasure craft and about 60 percent from chartered boats. Ocean sportfishing for salmon generates an estimated $10.4 million annually in trip-related spending in the area. Of this, nonresidents account for 40 percent. Businesses that benefit from trip-related spending by ocean salmon sport fishers include charter-boat operations, retail operations that provide goods to sport fishers (e.g., restaurants, bait and tackle stores), and lodging places.

Irrigated agriculture is potentially affected by CVP-San Felipe Unit water supplies.

Irrigated agriculture is potentially affected by CVP-San Felipe Unit water supplies. The major water user is Santa Clara Valley Water District (SCVWD); San Benito County also receives some CVP water. CVP hydropower is used in the region for public, residential, commercial, and industrial purposes. Increased power costs might

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TABLE 3-51
Employment Data for Lower Klamath River Basin/Coastal Area Regions, 1992

	Monterey Region		San Francisco Region		Mendocino Region		KMZ-California Region		KMZ-Oregon Region		Northern/Central Oregon Region	
Economic Sectors	**Employment**	**Percent of Total**	**Employment**	**Percent of Total**	**Employment**	**Percent of Total**	**Employment**	**Percent of Total**	**Employment**	**Percent of Total**	**Employment**	**Percent of Total**
Agriculture, forestry, fishing	54,110	12.2	41,560	1.2	3,640	8.7	3,630	5.0	520	6.1	13,690	4.9
Commercial fishing	210	<0.1	440	<0.1	180	0.4	520	0.7	130	1.5	900	0.3
Mining	490	0.1	5,220	0.1	50	0.1	70	0.1	10	<0.1	550	0.2
Construction	25,770	5.8	189,100	5.4	3,000	7.2	4,700	6.5	810	9.5	16,150	5.8
Manufacturing	30,600	6.9	460,270	13.0	4,960	11.9	7,110	9.9	860	10.0	38,720	13.8
Canned & cured seafood	300	<0.1	50	<0.1	10	<0.1	50	<0.1	10	0.1	40	<0.1
Prepared fresh/frozen seafood	150	<0.1	480	<0.1	170	0.4	410	0.6	100	1.2	1,700	0.6
Transportation; communications; electric, gas, & sanitary services	14,110	3.2	163,980	4.6	1,280	3.1	2,730	3.8	280	3.3	10,430	3.7
Wholesale trade	17,760	4.0	211,450	6.0	1,300	3.1	3,140	4.4	310	3.6	10,850	3.9
Retail trade	72,290	16.3	521,750	14.8	7,770	18.6	13,500	18.7	1,960	22.8	54,350	19.4
Food stores	10,300	2.3	68,010	1.9	1,640	3.9	2,280	3.2	370	4.3	8,540	3.0
Eating & drinking places	26,390	5.9	168,810	4.8	2,300	5.5	4,150	5.8	630	7.3	18,500	6.6
Auto dealers & service stations	6,210	1.4	39,740	1.1	660	1.6	1,420	2.0	260	3.0	5,960	2.1
Finance, insurance, real estate	22,070	5.0	306,630	8.7	1,940	4.7	3,300	4.6	560	6.5	15,080	5.4
Services	116,040	26.1	1,136,580	32.2	11,560	27.7	19,370	26.9	1,890	22.1	70,230	25.0
Lodging	11,630	2.6	39,540	1.1	1,640	3.9	1,350	1.9	470	5.5	6,140	2.2
Government	86,760	19.5	474,010	13.4	6,110	14.7	13,690	19.0	1,250	14.6	48,120	17.2
Other	4,160	0.9	23,660	0.7	80	0.2	810	1.1	130	1.5	2,150	0.8
Totals	**444,160**	**100.0**	**3,534,210**	**100.0**	**41,690**	**100.0**	**72,050**	**100.0**	**8,580**	**100.0**	**280,310**	**100.0**

Source: IMPLAN, 1992.

increase industry costs and reduce discretionary income in the region. CVP water is used in the CCWD and SCVWD for M&I purposes. CVP water is practically the only supply available to CCWD, but SCVWD has a variety of supplies.

Mendocino Coastal Area. The Mendocino Coastal Area extends from Point Arena to Horse Mountain, California, and includes the port area of Fort Bragg in Mendocino County. The area is primarily rural, with an economy based largely on agriculture, forestry, and tourism. Total industrial output was valued at $3.0 billion. Place of work income was estimated at $1.5 billion, and approximately 41,700 persons were employed. Major employment sectors within the area include services (28 percent of regional employment); retail trade (19 percent); government (15 percent); manufacturing (12 percent); and agriculture, forestry, and fishing (9 percent) (Table 3-51).

The (Mendocino Coastal Area) is primarily rural, with an economy based largely on agriculture, forestry, and tourism…(This economy) is potentially affected by changes in ocean commercial and sport fishing for salmon.

The economy of the area is potentially affected by changes in ocean commercial and sport fishing for salmon. Employment in the area's commercial fishing sector totaled 180 jobs in 1992. Commercial fish harvests generated an additional 180 jobs in the seafood processing sector. Together, these two sectors accounted for approximately 0.9 percent of total employment within the area. Commercial salmon harvest has declined substantially in the area since 1990 due to harvest restrictions and reallocation of salmon harvests among user groups. In 1996, the area accounted for 5.5 percent of California's commercial salmon harvest, generating an estimated $308,000 in gross harvest revenue (Pacific Fishery Management Council, 1997).

About 90 percent of ocean sportfishing for salmon takes place from privately owned pleasure craft and about 10 percent from chartered boats. Ocean sportfishing for salmon generates an estimated $1.9 million annually in trip-related spending in the area. Of this, nonresidents account for about 25 percent. Businesses that benefit from trip-related spending by ocean salmon sport fishers include charterboat operations, retail operations that provide goods to sport fishers (e.g., restaurants, bait and tackle stores), and lodging places.

The (KMZ-California Coastal Area) is characterized by a resource-based economy including forestry, wood-products manufacturing, and commercial fishing.

KMZ-California Coastal Area. The KMZ-California Coastal Area extends from Horse Mountain to Point St. George, California, and includes the port areas of Eureka and Trinidad in Humboldt County and Crescent City in Del Norte County. This coastal area also includes the lower Klamath River Basin. The region is characterized by a resource-based economy including forestry, wood-products manufacturing, and commercial fishing. The Eureka area serves as a regional center for retail trade and consumer services. Total regional output in 1992 was valued at $5.0 billion. Place of work income was estimated at $2.7 billion, and approximately 72,000 persons were employed. Major employment sectors include services (27 percent of

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regional employment), retail trade (19 percent), government (19 percent), and manufacturing (10 percent) (Table 3-51).

The economy of the (KMZ-California Coastal Area) is potentially affected by changes in ocean commercial and sport fishing for salmon.

The economy of the area is potentially affected by changes in ocean commercial and sport fishing for salmon. Employment in the area's commercial fishing and processing sectors totaled 520 and 460 jobs, respectively, in 1992. Together, these two sectors accounted for 1.4 percent of total employment within the area. Commercial salmon harvests in the area have steadily declined since the 1970s and virtually disappeared in the early 1990s when harvest restrictions closed the salmon fishery during certain years. The reallocation of salmon resources among fishery groups has also diminished ocean commercial salmon harvests in recent years. In 1996, 11,700 salmon were harvested in the area, which resulted in an estimated $185,000 in gross revenue, or about 3.2 percent of the California total (Pacific Fishery Management Council, 1997).

(The KMZ-Oregon Coastal Area) is largely rural with a resource-based economy…(and is) potentially affected by changes in ocean commercial and sport fishing for salmon.

About 95 percent of ocean sportfishing for salmon takes place from privately owned pleasure craft and about 5 percent from chartered boats. Ocean sportfishing for salmon generates an estimated $2.1 million annually in trip-related spending. Of this, nonresidents account for about 20 percent. Businesses that benefit from trip-related spending by ocean salmon sport fishers include charterboat operations, retail operations that provide goods to sport fishers (e.g., restaurants, bait and tackle stores), and lodging places. In addition to ocean sportfishing, sportfishing for salmon and steelhead on the lower Klamath River generates an estimated $1.3 million annually in spending.

KMZ-Oregon Coastal Area. The KMZ-Oregon Coastal Area extends from Point St. George, California, to Humbug Mountain, Oregon, and includes the port area of Brookings in Curry County, Oregon. The region is largely rural with a resource-based economy. Total regional output in 1992 was valued at $544.0 million. Place of work income was estimated at $275.6 million, and approximately 8,600 persons were employed. Major employment sectors include retail trade (23 percent of regional employment), services (22 percent), government (15 percent), and manufacturing (10 percent) (Table 3-51).

Commercial salmon harvests in the (KMZ-Oregon Coastal Area) have steadily declined since the 1970s and virtually disappeared in the early 1990s when harvest restrictions closed the fishery during certain years.

The economy of the area is potentially affected by changes in ocean commercial and sport fishing for salmon. Employment in the area's commercial fishing and processing sectors totaled 130 and 110 jobs, respectively, in 1992. Together, these sectors accounted for 2.8 percent of total employment within the area. Commercial salmon harvests in the area have steadily declined since the 1970s and virtually disappeared in the early 1990s when harvest restrictions closed the fishery during certain years. The reallocation of salmon resources among fishery groups has also diminished ocean

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commercial salmon harvests in recent years. In 1996, 8,500 salmon were harvested in the area, which resulted in an estimated $150,000 in gross revenue, or about 4.9 percent of the Oregon total (Pacific Fishery Management Council, 1997).

About 95 percent of ocean sportfishing for salmon takes place from privately owned pleasure craft and about 5 percent from chartered boats. Ocean sportfishing for salmon generates an estimated $4.2 million annually in trip-related spending in the area. Of this, nonresidents account for about 20 percent. Businesses that benefit from trip-related spending by ocean salmon sport fishers include charterboat operations, retail operations that provide goods to sport fishers (e.g., restaurants, bait and tackle stores), and lodging places.

Northern/Central Oregon Coastal Area. The Northern / Central Oregon Coastal Area is a large region that extends from Humbug Mountain to Leadbetter Point, Washington, and includes the port areas of Coos Bay, Newport, Tillamook, and the Columbia River within the counties of Coos, Douglas, Lane, Lincoln, Tillamook, and Clatsop. The area is largely rural and coastal, although Lane and Douglas Counties take in inland area that include the larger communities of Eugene and Roseburg. Total regional output in 1992 was valued at $20.2 billion. Place of work income was estimated at $10.3 billion, and approximately 280,300 persons were employed. Major employment sectors include services (25 percent of regional employment), retail trade (19 percent), government (17 percent), and manufacturing (14 percent) (Table 3-51).

The (Northern/Central Oregon Coastal Area) is largely rural and coastal… The economy of the area is potentially affected by changes in ocean commercial and sport fishing for salmon.

The economy of the area is potentially affected by changes in ocean commercial and sport fishing for salmon. Employment in the area's commercial fishing and processing sectors totaled 900 and 1,740 jobs, respectively, in 1992. Together, these two sectors accounted for 0.9 percent of total employment within the area. Commercial salmon harvests in the area have declined somewhat since 1990 due to harvest restrictions and fishery conditions. This has been especially true in the Coos Bay area, which has been subject to restrictions protecting Klamath / Trinity fall chinook salmon. In 1996, 166,600 salmon were harvested in the area, which resulted in an estimated $2.9 million in gross revenue, or about 95.1 percent of the Oregon total (Pacific Fishery Management Council, 1997).

About 75 percent of ocean sport fishing for salmon takes place from privately owned pleasure craft and about 25 percent from chartered boats. Ocean sportfishing for salmon generates an estimated $6.1 million annually in trip-related spending in the area. Of this, nonresidents account for 20 percent. Businesses that benefit from trip-related spending by ocean salmon sport fishers include charterboat operations, retail operations that provide goods to sport fishers (e.g., restaurants, bait and tackle stores), and lodging places.

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Many coastal communities have historically been tied to the (fishing) industry. For most individuals who fish, it is not just a job and a way to earn a living; it is a way of life.

Current Social Conditions. The Mendocino Coastal, KMZ-California Coastal, KMZ-Oregon Coastal, and Northern/Central Oregon Coastal Area have all experienced a steady decline in the commercial salmon fishing industry. Many coastal communities have historically been tied to the industry. For most individuals who fish, it is not just a job and a way to earn a living; it is a way of life. Often, previous generations of the same families have been fishers. With the decline of the salmon stocks and the increasing restrictions on salmon fishing, many of those individuals have had to abandon their way of life and seek other employment. Many of those who continue to pursue the fishing way of life must have supplemental employment. Individuals must often leave their historical fishing areas near their homes and go to other distant places to fish for salmon during the remaining fishing seasons. The younger generation sees little future in pursuing their fishing heritage as a way of life.

Central Valley. For purposes of the socioeconomics analysis, the Central Valley region consists of three subregions: the Sacramento Valley, the San Joaquin Valley, and the Tulare Basin (Figure 3-34). Recent Central Valley employment data are presented in Table 3-52.

Current Economic Conditions.

(The Central Valley) is characterized by fast-growing urban centers and smaller towns with a strong agricultural base…(and) is potentially affected by changes in agricultural production, hydropower generation, M&I supply, and water-oriented recreation.

Sacramento Valley. The Sacramento Valley incorporates the flood plain of the Sacramento River and ranges from Shasta County to the Bay/Delta. The region is characterized by fast-growing urban centers and smaller towns with a strong agricultural base. As derived from the IMPLAN model, total output was valued at $96 billion, and about 1.3 million persons out of a population of 2.7 million were employed in 1991. The economy of the Sacramento Valley is potentially affected by changes in agricultural production, hydropower generation, M&I water supply, and water-oriented recreation.

Rice, grains, hay, pasture, vegetables, fruits, and nuts are important crops in the Sacramento Valley. Farm supply and product processing industries are important, especially in the smaller communities. CVP hydropower is used in the region for public, agricultural, residential, commercial, and industrial purposes. Important preference power users include irrigation and water districts having CVP contracts and municipal districts such as the cities of Roseville, Redding, and Shasta Lake. CVP M&I water supplies are used at locations scattered throughout the valley. Some M&I users have limited alternative supplies. Trip-related recreational spending occurs from use at rivers and reservoirs including the Sacramento River and Shasta and other CVP reservoirs.

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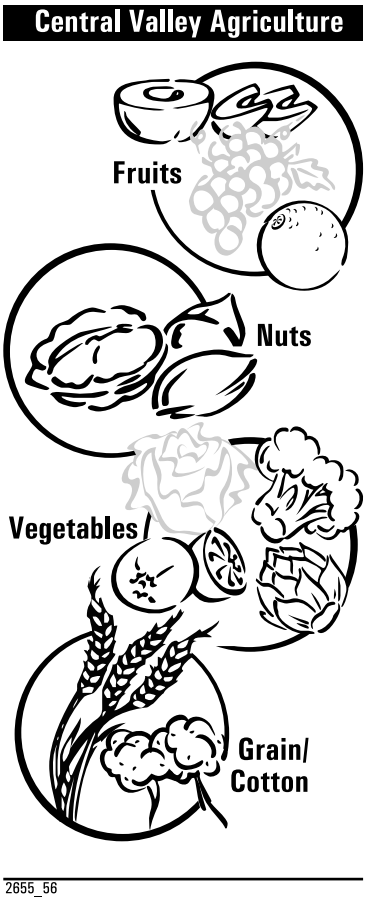
TABLE 3-52
Employment Data for Central Valley Regions, 1991

Industry	Sacramento Valley		San Joaquin Valley		Tulare Basin	
	Employment (1,000's)	Percent of Total	Employment (1,000's)	Percent of Total	Employment (1,000's)	Percent of Total
Agriculture, forestry, fisheries	57.6	4.4	150.0	16.9	108.3	23.1
Mining	1.8	0.1	1.5	0.2	3.8	0.8
Construction	104.6	8.1	58.2	6.5	35.0	7.5
Manufacturing	82.2	6.3	91.1	10.2	26.6	5.7
Transportation, communication, utilities	45.0	3.5	32.6	3.7	22.8	4.9
Wholesale, retail trade	264.9	20.4	169.7	19.1	80.7	17.2
Finance, insurance, real estate	107.6	8.3	59.6	6.7	21.6	4.6
Services	327.2	25.2	191.0	21.5	85.4	18.2
Government enterprise & special industry	306.3	23.6	136.5	15.3	84.6	18.0
Total	**1,297.3**	**100.0**	**890.2**	**100.0**	**468.7**	**100.0**

Source: IMPLAN, 1991.

San Joaquin Valley. The region incorporates the floodplain of the San Joaquin River and ranges from the Bay / Delta to Fresno County. The region is characterized by fast-growing urban centers and smaller towns with a strong agricultural base. As derived from the IMPLAN model, total output was valued at $61 billion, and about 0.9 million persons out of a population of 1.9 million were employed in 1991. The area's economy is potentially affected by changes in agricultural production, hydropower generation, M&I water supply, and water oriented recreation.

The San Joaquin Valley is an important agricultural region. Important crops include fruits, nuts, vegetables, and field crops. Some CVP water supplied by the Friant Unit would not be affected by the proposed alternatives. Potentially affected irrigation is primarily in the San Luis Unit and the Delta Mendota Canal service areas. Farm supply and product processing industries are important, especially in the smaller communities. CVP hydropower is used in the region for public, irrigation, residential, commercial, and industrial purposes. Important preference power users include irrigation and water districts having CVP contracts and municipal districts such as the City of Lodi and military users. CVP M&I water supplies are provided for use in locations scattered around the valley. Some M&I users have limited alternative supplies. Trip-related recreational spending



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occurs from use at rivers and reservoirs including the San Joaquin River, and San Luis and other CVP reservoirs.

Tulare Basin. The Tulare Basin ranges from Fresno County to Kern County. In general, the region is characterized by fast-growing urban centers and smaller towns with a strong agricultural base. As derived from the IMPLAN model, total 1991 output was valued at $36.5 billion, and about 0.5 million persons out of a population of 1 million were employed in 1991.

The area's economy is potentially affected by changes in agriculture production. The region is an important agricultural region that produces fruits, nuts, vegetables, and field crops. Most CVP water use in the region is from the Friant Unit of the CVP, which would not be affected by the alternatives proposed in this DEIS/EIR. Farm supply and product processing industries are important, especially in the smaller communities.

Current Social Conditions. Central Valley farmers who depend on irrigation are being affected by a wide array of decisions affecting their way of life, many of which are outside their control. For example, changes in farm subsidies and water supplies are accumulating. While farming has always had risks and uncertainties associated with it, recent changes have increased those elements. The loss of control some farmers feel has increased their stress and concern for maintaining their way of life.

Producers, marketers, and consumers of CVP hydropower are facing new challenges as the deregulation of the power industry and changes in water supply are occurring simultaneously.

Producers, marketers, and consumers of CVP hydropower are facing new challenges as the deregulation of the power industry and changes in water supply are occurring simultaneously. The uncertainty about what will happen, how to plan for the future, and how each user of CVP hydropower will be affected is an existing social concern.

Environmental Consequences.

Methodology and Impact Evaluation Criteria. Input-output (I-O) analysis is often used to measure changes in total economic activity within a region. I-O models attempt to represent a region's economic activity through use of inter-industry tables reflecting transactions between industries at a given point in time. As a result, these models consider the trade linkages between directly and indirectly affected sectors of the economy. For this DEIS/EIR, regional impacts were estimated using IMPLAN, an I-O modeling and database package.

For this DEIS/EIR, regional impacts were estimated using IMPLAN, an I-O modeling and database package.

Due to the broad range of regional economic analyses pursued in this section (e.g., agriculture, hydropower, M&I, recreation, fisheries), the focus of the evaluations is on aggregated impacts within each region. Because the Lower Klamath River Basin/Coastal Area and Central Valley regions are so large, impacts are evaluated at the subregion

level. For all analyses, three levels of comparison were performed: (1) total economic effects, (2) economic effects by sector , and (3) analyses of more affected groups. Despite certain analyses (e.g., recreation and fishing) providing numeric results, the more affected group analysis is largely qualitative.

Impact thresholds were applied to employment estimates (Table 3-53). For evaluating the importance of total impacts at the subregion level, thresholds range from 0.1-5 percent depending on the size of the region or subregion. For evaluating sector-level impacts, the thresholds ranged from 10-50 jobs and 5-20 percent. Generally speaking, smaller regions used large thresholds and larger regions used small thresholds. These thresholds are based on consideration of the margin of error associated with the analysis and the yearly variation in employment within the various regional economies and sectors. Exceedence of these thresholds is considered a substantial effect.

TABLE 3-53
Impact Thresholds by Analysis Type and Region

Region	Total Impact Threshold (percent)	Sector Impact Threshold	Most Affected Group Threshold
Trinity River Basin			
Up-front Impacts (Trinity County only)	5	10 jobs and 20%	Qualitative
2020 Annual Impacts (Trinity & Shasta Counties)	1	20 jobs and 10%	>20% of No Action[a]
Lower Klamath River Basin/Coastal Area			
Monterey	0.1	50 jobs and 5%	>20% of No Action[a]
San Francisco	0.1	50 jobs and 5%	>20% of No Action[a]
Mendocino	1	20 jobs and 10%	>20% of No Action[a]
KMZ-California	1	20 jobs and 10%	>20% of No Action[a]
KMZ-Oregon	1	20 jobs and 10%	>20% of No Action[a]
Northern/Central Oregon	1	20 jobs and 10%	>20% of No Action[a]
Central Valley			
Sacramento Valley	0.1	50 jobs and 5%	Qualitative
San Joaquin Valley	0.1	50 jobs and 5%	Qualitative
Tulare Basin	0.1	50 jobs and 5%	Qualitative

[a]Applied to recreation and fishing analyses only.

Cost Methodology: The following cost elements were considered: dam modification, channel rehabilitation construction, existing and new channel rehabilitation maintenance, spawning gravel placement, expanded dredging, and watershed protection activities. All costs were measured on an annual basis; however, actual durations vary

from up-front, to temporary, to periodic, to long-term. Given the largest of the costs and impacts are expected up-front, as opposed to in the distant future (i.e., 2020), up-front impacts provide the emphasis of the cost discussion. Annual costs by element were reviewed to estimate the percent expected to be incurred and remain in the Trinity County region. The in-region costs were linked with appropriate regional industries and run through the IMPLAN I-O model for Trinity County to estimate local impacts.

Water-oriented Recreation Methodology: Regional recreation impacts were developed by estimating the effects of changes in non-resident recreator spending by region and alternative. Estimates of recreation use by alternative and activity, developed from statistical models of recreation demand (as presented in Section 3.8), were combined with activity-specific recreator expenditure profiles to calculate regional recreation expenditures. The changes in recreation expenditure were assigned to appropriate economic sectors and run through the IMPLAN model to estimate impacts by region and alternative. The region used for analyzing these impacts in the Trinity River Basin includes Trinity and Shasta Counties.

In the Central Valley the assessment of socioeconomic impacts resulting from project-related changes in water-oriented recreation focuses on changes at affected reservoirs and rivers. Because changes in hydrology at affected Central Valley facilities were not expected to substantially affect recreation opportunities, socioeconomic impacts related to recreation were not quantified.

Hydropower Methodology: Data on changes in hydropower value were obtained from Western. It was assumed that a change in hydropower value has an equivalent impact on the value of personal consumption expenditure originating in the region (i.e., increased hydropower costs are passed on to the public through rate increases). IMPLAN includes a personal consumption vector that allocates the change in expenditure over regional industries and imports. The impact on regional personal consumption is less than the value of hydropower lost because of the leakage caused by import purchases.

Sportfishing Methodology: Regional sportfishing impacts were developed by estimating the effects of changes in non-resident angler spending by region and alternative. Estimates of sportfishing use by alternative, developed from statistical models of recreation demand (as presented in Section 3.5.4), were combined with angler expenditure profiles to calculate regional recreation expenditures. In addition, changes in charter boat operational spending within the various subregions was also considered. The changes in angler and charter boat expenditures were assigned to appropriate economic sectors and run through the IMPLAN model to estimate impacts by region and alternative.

Commercial Fisheries Methodology: Economic impacts resulting from changes in ocean commercial salmon harvests were estimated based on the assessment of harvests contained in the Ocean Fishery Economics section (Section 3.5.4). Changes in salmon harvest values were used to derive changes in final demand for the commercial fishing and processing industries. These changes were used with the IMPLAN I-O model to estimate total changes in employment for the commercial fishing and seafood processing industries.

Agriculture Methodology: Data on changes in value of production and net income in agriculture were obtained from the Agriculture section (Section 3.9.2). Impacts associated with a change in gross value of production were captured by changing the value of production of that crop in the pertinent I-O IMPLAN model. I-O normally includes backward trade linkages only, so an adjustment is required to avoid understating total impacts by neglecting forward linkages. For rice, sugar, and fruits and vegetables the analysis includes an adjustment to capture impacts in forward processing. Some impacts cannot be captured by use of the change in value of production only. Changes in application of irrigation technology, changes in groundwater pumping costs, and revenue changes from changes in crop prices are handled separately. First, the net effect of these changes on net farm income is estimated. It is assumed that expenditures on retail goods and farm machinery and equipment are affected. If net income is increased, expenditures on these two sectors are each increased by half of the total increase in net revenue.

M&I Water Supply Methodology: Data on changes in cost of M&I water supply were obtained from the M&I water cost analysis (Section 3.9.1). It was assumed that a change in cost of M&I water supply has an equivalent inverse impact on the value of personal consumption expenditure originating in the region. IMPLAN includes a personal consumption vector that allocates the change in expenditure over regional industries and imports. The impact on regional personal consumption is less than the change in M&I water costs because of the leakage caused by import purchases.

Social Methodology: Social impacts and effects are the changes in people lives resulting from implementation of an alternative. During scoping and throughout the study, the public requested social impacts be identified. Public issues and concerns, the results of the regional economic analyses, and the results of the analyses of other resource areas were analyzed and discussed with individuals in and knowledgeable of the local and regional areas to identify social impacts.

Existing Conditions Methodology: Although CEQA does not require discussion of socioeconomic impacts, the modeled Preferred Alternative impacts were compared to modeled existing conditions,

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i.e., 1995 to provide consistency with other sections. IMPLAN estimates of total industry output, place of work income, and employment represent 1992 conditions. Therefore, they were adjusted to reflect 1995 conditions. For all sectors, except agriculture and commercial fishing, the correction was based on the ratio of the 1995 to 1992 populations. For the commercial fishing sector, no growth was assumed between those years. For the agricultural sectors, anticipated growth of 0.5 percent per year was used based on results from the Central Valley Production Model.

No Action.

Trinity River Basin.

Up-front Impacts. Given that the costs associated with the No Action Alternative are small, their specific contribution to the Trinity County economy were not estimated. Projecting measures of the overall economy to year 2001 (i.e., anticipated starting date for the cost components) resulted in $350.6 million in total industry output, $189.5 million in place of work income, and 5,045 jobs in Trinity County (see Table 3-54). These measures of economic activity are used to gauge the magnitude of the cost impacts for the other alternatives. (Summary Tables 3-54, 3-55, and 3-56 are located at the end of this Socioeconomics section.)

Annual Impacts.

2020 Economic Conditions: The population of Trinity and Shasta Counties is projected to increase substantially in coming years, reaching 256,600 by 2020 (California Department of Finance, 1998). Most of this growth would occur in Shasta County. Based on this growth, 1992 economic conditions were projected for 2020 (Table 3-54). Total industrial output is projected to reach $8.7 billion. Place of work income is projected to total $4.8 billion with regional employment totaling 119,100 jobs. The retail trade and lodging sectors are projected to represent 19.1 percent and 1.7 percent of regional employment, respectively, in 2020.

2020 Social Conditions: The expected increase in population and jobs would be viewed positively by most residents. However, some who moved to the area to get away from heavily populated areas may decide that the area is becoming too populated and choose to relocate to less populated areas. The potential for flooding would remain, with attendant concern by residents about whether their homes and property would be flooded. Water would not be returned to the Trinity River. As a result, many residents would continue to believe that the perceived adverse impacts to the local area as a result of the TRD will continue.

Lower Klamath River Basin/Coastal Area.

2020 Economic Conditions.

Monterey Coastal Area: The population of the Monterey Coastal Area is projected to increase substantially in coming years, reaching 1.3 million by 2020 (California Department of Finance, 1998). Total industrial output is projected to reach $51.7 billion within the region by 2020. Place of work income is projected to total $29.2 billion with regional employment totaling 715,200 jobs (Table 3-55). Future economic levels associated with ocean commercial fishing are assumed to remain similar to existing levels. Employment in the area's commercial fishing industry is estimated at 210 jobs in 2020. Seafood processing employment is estimated to total 2,450 jobs. Together, these industries would account for 0.4 percent of regional employment in 2020. The value of the ocean commercial salmon harvest is estimated to total $4.6 million. Economic activity associated with ocean sportfishing for salmon is expected to increase at a rate similar to the change in regional population. The economic sectors most affected by ocean sportfishing activity include wholesale trade, retail trade, and lodging places. Total projected employment in these sectors (163,700 jobs) would account for 23 percent of total employment in the area in 2020. Trip-related spending associated with ocean sportfishing for salmon would be about $11.4 million, of which $5.0 million would be made by nonresidents of the region. Businesses in the Monterey port area would be primary beneficiaries.

San Francisco Coastal Area: The San Francisco Coastal Area is expected to grow in population between now and 2020, but the rate of increase is not expected to be large compared to other areas of California. Since most of the available land in the region is already urbanized, additional urbanization and economic growth will occur primarily through intensification. The value of output is expected to be $431 billion in the year 2020. Place of work income is estimated to be $245 billion, and 4.5 million persons out of a population of 7.1 million would be employed (Table 3-55). Major employment sectors would include services (32 percent of regional employment), wholesale / retail trade (20 percent), government (14 percent), and manufacturing (16 percent). Future economic levels associated with ocean commercial fishing are assumed to remain similar to existing levels. The value of the ocean commercial salmon harvest would total $5.9 million in 2020. Economic activity associated with ocean sportfishing for salmon is expected to increase at a rate similar to the change in regional population. Trip-related spending associated with ocean sportfishing for salmon would be about $13.2 million, of which $5.1 million would be made by nonresidents of the region. Businesses in the San Francisco port area would be the primary beneficiaries.

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Mendocino Coastal Area: The population of the Mendocino Coastal Area is projected to reach 118,800 by 2020 (California Department of Finance, 1998). Total industrial output is projected to reach $4.3 billion within the region by 2020. Place of work income is projected to total $2.1 billion with regional employment totaling 59,800 jobs (Table 3-55). Future economic levels associated with ocean commercial fishing are assumed to remain similar to existing levels. Employment in the area's commercial fishing industry and seafood processing industry is estimated at 180 jobs in each sector in 2020. Together, these industries would account for 0.6 percent of regional employment. The value of the ocean commercial salmon harvest is estimated at $404,000 in 2020. Economic activity associated with ocean sportfishing for salmon is expected to increase at a rate similar to the change in regional population. The economic sectors most affected by ocean sportfishing activity include wholesale trade, retail trade, and lodging places. Total projected employment in these sectors (15,370 jobs) is estimated to account for 26 percent of total employment in the area in 2020. Trip-related spending associated with ocean sportfishing for salmon is estimated to be $2.6 million in 2020, of which $661,000 would be made by nonresidents of the region. Businesses in the Fort Bragg port area would be the primary beneficiaries of these activities.

KMZ-California Coastal Area: The population of the KMZ-California Coastal Area is projected to grow slowly in coming years, reaching a population of 183,000 by 2020 (California Department of Finance 1998). Total industrial output is projected to reach $6.1 billion within the region by 2020. Place of work income is projected to total $3.3 billion with regional employment totaling 88,000 jobs. Future economic levels associated with ocean commercial fishing are assumed to remain similar to existing levels. Employment in the area's commercial fishing industry is estimated at 520 jobs in 2020. Seafood processing employment is estimated at 460 jobs (Table 3-55). Together, these industries would account for 1.1 percent of regional employment in 2020. The value of the ocean commercial salmon harvest is estimated at $61,900. Economic activity associated with sportfishing for salmon in the ocean and along the Klamath River is expected to increase at a rate similar to the change in regional population. The economic sectors most affected by sportfishing activity include wholesale trade, retail trade, and lodging places. Projected employment in these sectors (21,970 jobs) is estimated to account for about 25 percent of total employment in the area in 2020. Trip-related spending associated with sportfishing for salmon is estimated to be $3.2 million in 2020, of which $1.8 million would be made by nonresidents of the region. Businesses in the Eureka and Crescent City port areas would be primary beneficiaries from this activity.

KMZ-Oregon Coastal Area: The population of the KMZ-Oregon Coastal Area is projected to grow to 32,500 by 2020 (Oregon Office of Economic Analysis, 1997). Total industrial output is projected to reach $848.4 million within the region by 2020. Place of work income is projected to total $429.7 million with regional employment totaling 13,500 jobs. Future economic levels associated with ocean commercial fishing are assumed to remain similar to existing levels. Employment in the area's commercial fishing industry is estimated at 130 jobs in 2020. Seafood processing employment is estimated to total 110 jobs (Table 3-55). Together, these industries would account for 1.8 percent of regional employment in 2020. The value of the ocean commercial salmon harvest is estimated to total $54,200. Economic activity associated with ocean sportfishing for salmon is expected to increase at a rate similar to the change in regional population. The economic sectors most affected by ocean sportfishing activity include wholesale trade, retail trade, and lodging places. Total projected employment in these sectors (4,310 jobs) would account for 32 percent of total employment in the area in 2020. Trip-related spending associated with ocean sportfishing for salmon would be $4.6 million, of which $926,000 would be made by non-residents of the region. Businesses in the Brookings port area would be the primary beneficiaries from this activity.

Northern / Central Oregon Coastal Area: The population of the Northern / Central Oregon Coastal Area is projected to grow to 737,800 by 2020 (Oregon Office of Economic Analysis, 1997). Total industrial output is projected to reach $27.1 billion within the region by 2020. Place of work income is projected to total $13.8 billion, with regional employment totaling 379,800 jobs. Future economic levels associated with ocean commercial fishing are assumed to remain similar to existing levels. Employment in area's commercial fishing industry is estimated at 900 jobs in 2020. Seafood processing employment is estimated to total 1,730 jobs (Table 3-55). Together, these industries would account for 0.7 percent of regional employment. The value of the ocean commercial salmon harvest would be $8.0 million. Economic activity associated with ocean sportfishing for salmon is expected to increase at a rate similar to the change in regional population. The economic sectors most affected by ocean sportfishing activity include wholesale trade, retail trade, and lodging places. Projected employment in these sectors (96,650 jobs) is estimated to account for about 25 percent of total employment in the area. Trip-related spending associated with ocean sportfishing for salmon is estimated to be about $15.2 million, of which $3.0 million would be made by nonresidents of the region. Businesses in the Coos Bay, Newport, Tillamook, and Columbia River port areas would be the primary beneficiaries from this activity.

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2020 Social Conditions. The commercial salmon fishing industry would remain depressed throughout most of the coastal areas. Communities and individuals who depend on the industry would continue to be stressed. Many of those who would continue to pursue the fishing way of life would have to have supplemental employment (those in smaller communities would have comparatively fewer opportunities). Many others would have to leave their historical fishing areas near their homes and go to other distant places to fish. Younger generations would continue to abandon fishing as a way of life. People in the lower Klamath River would continue to believe that the assurances and promises that the TRD would have no adverse impacts to the Trinity River (and indirectly, the Klamath River) were broken.

Central Valley.

2020 Economic Conditions.

Sacramento Valley: The Sacramento Valley is expected to grow rapidly in population between now and 2020 (Table 3-56). Value of output is expected to be $169 billion. Place of work income is estimated to $98 billion, and approximately 2.1 million persons out of a population of 4.0 million would be employed.

San Joaquin Valley: The San Joaquin Valley is expected to grow rapidly in population between now and 2020 (Table 3-56). Value of output is expected to be $155 billion. Place of work income is estimated to $78 billion, and approximately 1.8 million persons out of a population of 3.8 million would be employed.

Tulare Basin: The Tulare Basin is expected to grow rapidly in population between now and 2020 (Table 3-56). Value of output is expected to be $78 billion. Place of work income is estimated to $39 billion, and approximately 1.0 million persons out of a population of 2.0 million would be employed.

2020 Social Conditions. Due to population growth, all Central Valley residents would feel increased stress regarding water issues, even if there are no changes to TRD operations. Irrigated agricultural landowners would be stressed by other changes to water supply, as well as changes in farm subsidies. The associated loss of control would exacerbate their stress. Producers, marketers, and consumers of CVP hydropower would continue to face new challenges due to the deregulation of the power industry and non-TRD changes in water supply.

Maximum Flow.

Trinity River Basin.

Up-front Impacts. The costs associated with the Maximum Flow Alternative are expected to generate $3.6-6.2 million in total industry output, $1.8-3.0 million in place of work income, and 45-77 additional jobs depending on the dam modification option (Table 3-54). This represents more jobs in Trinity County than any other alternative due primarily to the dam modification component. These dam modification costs are anticipated to last at most a couple of years, implying only a short-term impact. After dam modification is complete, job generation drops off dramatically. The 77 additional jobs reflect an insubstantial 1.5 percent of projected 2001 Trinity County employment.

The individual economic sectors in Trinity County most affected by the cost elements associated with the Maximum Flow Alternative are the construction, wholesale trade, auto dealers and service stations, and eating and drinking sectors.

The individual economic sectors in Trinity County most affected by the cost elements associated with the Maximum Flow Alternative are the construction, wholesale trade, auto dealers and service stations, and eating and drinking sectors. The largest impacts are expected in the construction sector, with an additional 18 jobs under the most costly dam modification scenario; however, this represents less than 5 percent of the 2001 projected employment within the construction sector. The only sector that meets the criteria for a substantial impact is the auto dealer and service station sector under the most costly dam modification option. The sector is expected to increase by 11 jobs and 19.8 percent. Since the least costly dam modification option is a more likely scenario, and it results in no substantial impacts by sector, the alternative is not expected to generate substantial sector-level impacts.

Since the largest cost element associated with the alternative is the modification of Trinity Dam, those service industries closest to the dam would be most affected by the temporary workforce (1-2 years only).

Costs associated with spawning gravel placement are likely to be highly dispersed; therefore, concentrated effects on service sector industries would not materialize.

Annual Impacts.

Although recreation-related spending associated with use of the Trinity River would increase (under the Maximum Flow Alternative), these effects would be more than offset by decreases in recreation-related spending associated with use of Trinity and Shasta Reservoirs.

2020 Economic Impacts: Under the Maximum Flow Alternative, the Trinity / Shasta County regional economy would be negatively affected by decreases in spending associated with water-oriented recreation. Although recreation-related spending associated with use of the Trinity River would increase, these effects would be more than offset by decreases in recreation-related spending associated with use of Trinity and Shasta Reservoirs. Annual regional economic output would decrease by an estimated $6.3 million, place of work income

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by $2.6 million, and employment by 66 jobs (Table 3-54). These changes are not considered substantial. Revenues specific to businesses in Trinity County are estimated to increase $2.0 million annually.

The economic sectors most affected by recreation activity are wholesale trade, retail trade, and lodging places. Annual employment in these sectors is estimated to decrease by 39 jobs, with 25 of those occurring in the retail trade sector. These impacts are not considered substantial.

Businesses that primarily cater to persons recreating at Trinity and Shasta Reservoirs, or along the Trinity River, would be most impacted by this alternative. These businesses include concessionaires, marina operators and other service providers at the lakes, and guiding and recreation services along the river. Adverse, but not substantial, impacts would be experienced by businesses that serve recreationists at Trinity and Shasta Reservoirs. Businesses that primarily serve persons recreating along the Trinity River would experience a substantial positive impact.

2020 Social Impacts: While the overall economic changes in Trinity and Shasta Counties would not be substantial, groups of people would be affected differently. Some people who formerly went to Trinity and Shasta Reservoirs for recreation would no longer do so because of decreased water elevations. The increased flow in the Trinity River would attract more people to river recreation opportunities. Because of the increased risk of flooding associated with this alternative, some residents with developed parcels along the river would have to be relocated. While they would be compensated for their property, comparable river-front property would likely not be available in the Trinity County area. These individuals would have to seek similar property elsewhere or stay in the area and live in a different setting. Some may not welcome having to move. Others may prefer to move to be away from the risk of flooding. Those who advocated that more Trinity River water remain in the river would have their desire fulfilled.

The Monterey Coastal Area would be unaffected by implementation of the Maximum Flow Alternative.

Lower Klamath River Basin/Coastal Area.

2020 Economic Impacts.

Monterey Coastal Area: The Monterey Coastal Area would be unaffected by implementation of the Maximum Flow Alternative because this area has historically been less affected by restraints imposed to protect Klamath River Basin salmon. Therefore, easing harvest restrictions on naturally produced Trinity River salmon would have little effect on the overall harvest in this region. No project-related

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changes in ocean commercial salmon harvests or sportfishing-related spending are expected within the region.

San Francisco Coastal Area: The San Francisco Coastal Area would be affected by a positive change in ocean sportfishing and commercial fishing activity, by a negative change in M&I water supply, electricity costs, and agricultural production and net returns. The total loss of output would be $159.6 million, place of work income would be reduced by $79.2 million, and employment would be reduced by 1,540 persons (Table 3-55). These values are not substantially different than No Action levels. The most affected sectors are vegetables, canned fruits and vegetables, eating and drinking establishments, and wholesale trade.

(Under the Maximum Flow Alternative,) the San Francisco Coastal Area would be affected by a positive change in ocean sportfishing and commercial fishing activity, by a negative change in M&I water supply, electricity costs, and agricultural production and net returns.

This alternative affects some industries more than others. Relatively large effects occur in vegetable production, canned fruit and vegetables, and certain retail, services, and finance-insurance-real estate sectors. The number of jobs lost in vegetable production and canned fruits and vegetables are 165 and 125, respectively, a substantial share of No Action levels. Some impacts would be concentrated in certain local communities that are relatively dependent on CVP power, CVP M&I supplies, and/or irrigated agriculture that uses CVP contract supplies. Most agricultural costs would occur in the southern Santa Clara Valley. Electricity cost increases would be important in certain water districts, such as the SCVWD, and within the service areas of preference customers, such as the cities of Alameda, Palo Alto, and Santa Clara. The most adverse effects stemming from M&I water costs would be within the CCWD.

The ocean commercial salmon fishing and processing industry, and businesses that cater to persons sportfishing for salmon including charter boat operators, marina operators, and other service providers near port areas, would benefit from this alternative. The gross value of the annual commercial harvest of salmon is estimated to increase by $262,400 (4 percent), and regional spending by persons ocean sportfishing for salmon would increase by $117,000 (1 percent) compared to No Action levels. These changes are not substantial.

Mendocino Coastal Area: The Mendocino Coastal Area economy would be beneficially affected by increases in ocean commercial salmon harvests and sportfishing-related spending changes under the Maximum Flow Alternative. These changes would result in annual regional industrial output increasing by $11.1 million, place of work income by $5.1 million, and employment by 127 jobs (Table 3-55). These increases are not considered substantial.

Employment in the overall commercial fishing and seafood processing sectors is estimated to increase by 33 and 31 jobs, respectively, within the region by 2020. These changes represent

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substantial increases of approximately 18 percent over 2020 No Action levels. The ocean commercial salmon fishing industry (in contrast to the overall fishing industry) would experience substantial economic benefits under the alternative. The gross value of the annual harvest is estimated to increase by $2.4 million, or 600 percent, compared to No Action levels. The economic sectors most affected by sportfishing activity are wholesale trade, retail trade, and lodging places. Annual employment in these sectors would increase by 26 jobs, with 18 of those occurring in the retail trade sector. These changes are not substantial. Businesses that primarily cater to persons sportfishing for salmon in the ocean, including charter boat operators, marina operators, and other service providers near affected port areas, would substantially benefit from this alternative. Regional spending by persons ocean sportfishing for salmon would increase by $987,000, or 37 percent, compared to No Action levels.

(Under the Maximum Flow Alternative, the Mendocino Coastal Area, KMZ-California, KMZ-Oregon, and Northern/Central Oregon Coastal Areas' economies would benefit from increases in ocean commercial salmon harvests and sportfishing-related spending.)

KMZ-California Coastal Area: Under the Maximum Flow Alternative, the KMZ-California Coastal Area economy would benefit from increases in ocean commercial salmon harvests and sportfishing-related spending changes by 2020. These changes would result in annual regional industrial output increasing by $3.0 million (Table 3-55). This 0.5 percent increase in output would generate $1.5 million in place of work income and 37 jobs within the region. These increases are not considered substantial compared to No Action levels. Note that these impacts are understated since the analysis does not include the effects of changes in tribal harvest.

Overall commercial fishing and seafood processing employment in the area would increase by an insubstantial 15 percent. The ocean commercial salmon fishing industry (in contrast to the overall industry) would experience substantial economic benefits. The gross value of the annual harvest is estimated to increase by $639,900, or 1,000 percent, compared to No Action levels. The economic sectors most affected by sportfishing activity are wholesale trade, retail trade, and lodging places. None of these sectors would be substantially impacted. Businesses that primarily cater to persons sportfishing for salmon in the ocean, including charter boat operators, marina operators, and other service providers near affected port areas, would substantially benefit from this alternative. Based on the predicted increase in ocean sportfishing trips for salmon, and along the lower Klamath River, regional spending by persons sportfishing for salmon would increase by $1.2 million, or 44 percent, compared to No Action levels.

KMZ-Oregon Coastal Area: Under the Maximum Flow Alternative, the KMZ-Oregon Coastal Area economy would benefit from increases in ocean commercial salmon harvests and sportfishing-

related spending. These changes would result in annual regional industrial output increasing by $3.9 million by 2020 (Table 3-55). This 0.5 percent increase in output would generate $1.7 million in place of work income and 62 jobs within the region. These changes are not substantial.

Overall commercial fishing and seafood processing employment in the area would increase by an insubstantial 10 percent. The ocean commercial salmon fishing industry would experience substantial economic benefits under the alternative. The gross value of the annual salmon harvest would increase by $533,100, or 900 percent, compared to No Action levels. The economic sectors most affected by sportfishing activity are wholesale trade, retail trade, and lodging places. None of these sectors would be substantially impacted. Businesses that primarily cater to persons sportfishing for salmon in the ocean, including charter boat operators, marina operators, and other service providers near affected port areas, would substantially benefit from this alternative. Regional spending by persons ocean sportfishing for salmon would increase by $1.4 million, or 42 percent, compared to No Action levels.

Northern/Central Oregon Coastal Area: Under the Maximum Flow Alternative, the Northern/Central Oregon Coastal Area economy would benefit from increases in ocean commercial salmon harvests and sportfishing-related spending. These changes would result in annual regional industrial output increasing by $51.1 million (Table 3-55). This 0.2 percent increase in output would generate $19.3 million in place of work income and 601 jobs within the region. These increases are not considered substantial.

Overall commercial fishing and seafood processing employment in the area would increase by a substantial 12 percent. The ocean commercial salmon fishing industry would experience substantial economic benefits under the alternative. The gross value of the annual harvest is estimated to increase by $4.6 million, or 55 percent, compared to No Action levels. The economic sectors most affected by sportfishing activity are wholesale trade, retail trade, and lodging places. None of these sectors would be substantially impacted. Businesses that primarily cater to persons sportfishing for salmon in the ocean, including charter boat operators, marina operators, and other service providers near affected port areas, would benefit from this alternative. Regional spending by persons ocean sportfishing for salmon would increase by $789,000, or 11 percent, compared to No Action levels. These changes are not considered substantial.

2020 Social Impacts. There would be no social impacts to the Monterey Coastal Area. In the San Francisco Coastal Area those losing jobs would have to seek employment in another business in the local area if such jobs were available, or leave the area to secure

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similar employment. Increased costs for electricity and M&I water would most adversely affect those with low incomes. In the Mendocino Coastal and Northern / Central Oregon Coastal Areas, the increases in commercial fishing opportunities would be welcomed by those wishing to pursue this way of life. The substantial increase in employment in seafood processing and benefits to businesses supporting sportfishing for salmon would be viewed as positive by the affected port areas. In the KMZ-California Coastal and KMZ-Oregon Coastal Areas the substantial increase in benefits to businesses supporting sportfishing for salmon would be viewed as positive by the affected communities.

Central Valley.

2020 Economic Impacts.

Sacramento Valley: The Sacramento Valley would be affected by a negative change in M&I water supply, electricity costs, and agricultural production and net returns. The total loss in output would be $50.6 million, place of work income would be reduced by $27.6 million, and employment would be reduced by 700 persons (Table 3-56). These values are not a substantial change from No Action levels. The most affected sectors are miscellaneous retail, eating and drinking establishments, and real estate.

(Under the Maximum Flow Alternative, the Sacramento and San Joaquin Valleys) would be affected by a negative change in M&I water supply, electricity costs, and agricultural production and net returns.

This alternative affects some industries and areas more than others. Relatively large, but insubstantial, effects occur in rice production and milling, and in certain retail, services, and finance-insurance-real estate sectors. Substantial impacts might be concentrated in certain local communities that are relatively dependent on CVP power, CVP M&I supplies, and / or irrigated agriculture using CVP contract supplies (e.g., the Tehama-Colusa Canal service area). Electricity cost increases would be important in certain water districts, such as SCID, and within the service areas of preference customers such as Roseville, Redding, and Shasta Lake. The most adverse effects stemming from M&I water costs would be in the Sacramento Area, especially Roseville.

San Joaquin Valley: The San Joaquin Valley would be affected by a negative change in M&I water supply, electricity costs, and agricultural production and net returns. The total loss in output would be $94.7 million, place of work income would be reduced by $50.1 million, and employment would be reduced by 1,510 persons (Table 3-56). These values are not substantially different than No Action levels. The most affected sectors are miscellaneous retail, farm machinery, cotton, and agricultural services. Substantial effects at the industry and local level may involve communities dependent on irrigated agriculture using CVP water.

This alternative affects some industries and areas more than others. Relatively large effects occur in cotton production and farm inputs such as farm machinery. Substantial effects could occur in some areas dependent on CVP M&I supplies or hydropower, e.g., Tracy, Avenal, Huron, and Coalinga. Substantial effects on local agricultural economies might occur in areas entirely dependent on CVP contracts, especially, the San Luis Canal service area.

Tulare Basin: The Tulare Basin would be affected by change in agricultural production and net returns. The total loss in output would be $28.0 million, place of work income would be reduced by $14.4 million, and employment would be reduced by 440 (Table 3-53). These changes are not substantial compared to No Action levels. The most affected sectors are miscellaneous retail and farm machinery. Substantial effects at the industry and local level may involve communities dependent on irrigated agriculture using CVP contract water.

The Tulare Basin would be affected by change in agricultural production and net returns (under the Maximum Flow Alternative).

2020 Social Impacts. In the Sacramento and San Joaquin Valleys the increased electricity and M&I water costs would most adversely affect those with low incomes. Agricultural employment and income would be adversely affected in communities served by the Tehama-Colusa Canal and San Luis Canal service areas. In the Tulare Basin, agricultural employment and income in those communities dependent on irrigated agriculture using CVP contract water could be adversely affected.

Flow Evaluation.

Trinity River Basin.

Up-front Impacts. Costs associated with the Flow Evaluation Alternative are expected to generate an additional $1.3 million in output/sales, $660,000 in income, and 22 jobs annually in Trinity County. This reflects the maximum impact and is expected during the first 3 years of implementation. The majority of the impact stems from the construction of the channel rehabilitation sites. Since site construction is anticipated to take 6 years, impacts become virtually nonexistent starting in year 7. Given this level of job creation represents less than 1 percent of the projected total employment in Trinity County in 2001, the impact of these additional jobs is not seen as substantial. The jobs generated in any particular sector are expected to be so small as to not result in any substantial impacts at the sector level.

The Flow Evaluation cost elements (construction of channel rehabilitation sites and spawning gravel placement) are dispersed throughout the watershed, implying a lack of concentrated regional economic impacts.

The largest cost elements known with any certainty relate to construction of channel rehabilitation sites and spawning gravel placement. The Flow Evaluation cost elements are dispersed throughout

the watershed, implying a lack of concentrated regional economic impacts.

Annual Impacts.

2020 Economic Impacts: Under the Flow Evaluation Alternative, the Trinity / Shasta County regional economy would be positively affected by increases in spending associated with increases in water-oriented recreation. Recreation-related spending associated with increases in use of the Trinity River and Trinity Reservoir would more than offset the decreases in recreation-related spending associated with projected declines in use at Shasta Reservoir. Annual regional economic output would increase by an estimated $3.2 million, place of work income would increase by $2.0 million, and employment would increase by 66 jobs (Table 3-51). These increases are not considered substantial. Revenues specific to businesses in Trinity County are estimated to increase $1.7 million annually.

Recreation-related spending associated with increases in use of the Trinity River and Trinity Reservoir (under the Flow Evaluation Alternative) would more than offset the decreases in recreation-related spending associated with projected declines in use at Shasta Reservoir.

The economic sectors most affected by recreation activity are wholesale trade, retail trade, and lodging places. Annual employment in these sectors is estimated to increase by 43 jobs, with 41 of those occurring in the retail trade and lodging sectors. These impacts are not considered substantial.

Businesses that primarily cater to persons recreating at Trinity and Shasta Reservoirs, or along the Trinity River, would be most impacted by this alternative. These businesses include concessionaires, marina operators and other service providers at the reservoirs, and guiding and recreation services along the river. Adverse, but not substantial, impacts would be experienced by businesses that serve recreationists at Shasta Reservoir. Positive, but not substantial, impacts would be experienced by businesses that serve recreationists at Trinity Reservoir. Businesses that primarily serve persons recreating along the Trinity River would experience a substantial positive impact.

2020 Social Impacts: While the overall economic changes in Trinity and Shasta Counties would not be substantial, groups of people would be affected differently. The increased flow in the Trinity River would attract more people to river recreation opportunities. Because of the increased risk of flooding associated with this alternative, some residents with parcels along the river would have to be relocated or would not be able to develop the sites. While they may be compensated for their property, comparable river-front property would likely not be available in the Trinity County area. Some people may prefer to move away from the river to reduce the risk of flooding. Those who advocated that more Trinity River water remain in the river would have their desire fulfilled.

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Lower Klamath River Basin/Coastal Area.

2020 Economic Impacts.

Monterey Coastal Area: The Monterey Coastal Area would be unaffected by implementation of the Flow Evaluation Alternative because this area has historically been less affected by restraints imposed to protect Klamath River Basin salmon. Therefore, easing harvest restrictions on naturally produced Trinity River salmon would have little effect on the overall harvest in this region. No project-related changes in ocean commercial salmon harvests or sportfishing-related spending are expected within the region under this alternative.

The Monterey Coastal Area would be unaffected by implementation of the Flow Evaluation Alternative.

San Francisco Coastal Area: The San Francisco Coastal Area would be affected by positive changes in commercial and sportfishing expenditures, by negative changes in M&I water supply, electricity costs, and agricultural production and net returns. The total loss in output would be $32.6 million, place of work income would be reduced by $16.2 million, and employment would be reduced by 310 persons (Table 3-55). These values are not substantial compared to No Action levels. Relatively large effects occur in CVP service areas and in preference power areas, but these are not expected to be substantial. The most affected sectors are vegetables, canned fruits and vegetables, eating and drinking establishments, and wholesale trade.

(Under the Flow Evaluation Alternative,) the San Francisco Coastal Area would be affected by positive changes in commercial and sportfishing expenditures, by negative changes in M&I water supply, electricity costs, and agricultural production and net returns.

The ocean commercial salmon fishing and processing industry, and businesses that cater to persons sportfishing for salmon including charter boat operators, marina operators, and other service providers near port areas, would benefit from this alternative. The gross value of the annual commercial harvest of salmon is estimated to increase by $262,400 (4 percent), and regional spending by persons ocean sportfishing for salmon would increase by $117,000 (1 percent) compared to No Action levels. These increases are not considered substantial.

Mendocino Coastal Area: Under the Flow Evaluation Alternative, the Mendocino Coastal Area economy would be beneficially affected by increases in ocean commercial salmon harvests and sportfishing-related spending. These changes would result in annual regional industrial output increasing by $9.6 million, place of work income increasing by $4.4 million, and employment increasing by 110 jobs (Table 3-55). These increases, which are 0.2 percent greater than No Action levels, are not considered substantial.

Overall commercial fishing and seafood processing employment in the area would increase by a substantial 16 percent. The ocean commercial salmon fishing industry would experience substantial economic benefits under the alternative. The gross value of the

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annual harvest is estimated to increase by $2.1 million, or 500 percent, compared to No Action levels. The economic sectors most affected by sportfishing activity are wholesale trade, retail trade, and lodging places. None of these sectors would be substantially impacted. Businesses that primarily cater to persons sportfishing for salmon in the ocean, including charter boat operators, marina operators, and other service providers near affected port areas, would substantially benefit from this alternative. Regional spending by persons ocean sportfishing for salmon would increase by $915,900, or 26 percent, compared to No Action levels.

KMZ-California Coastal Area: Under the Flow Evaluation Alternative, the KMZ-California Coastal Area economy would be beneficially affected by increases in ocean commercial salmon harvests and sportfishing-related spending. These changes would result in annual regional industrial output increasing by $2.9 million (Table 3-55). This growth in output would generate $1.5 million in place of work income and 36 jobs. These increases, which represent less than 0.1 percent of No Action levels, are not substantial. Note that these impacts are understated since the analysis does not include the effects of changes in tribal harvest.

(Under the Flow Evaluation Alternative, the Mendocino Coastal Area, KMZ-California, KMZ-Oregon, and Northern/Central Oregon Coastal Areas' economies would benefit from increases in ocean commercial salmon harvests and sportfishing-related spending.)

Overall commercial fishing and seafood processing employment in the area would increase by an insubstantial 1 percent. The ocean commercial salmon fishing industry would experience substantial economic benefits under the alternative. The gross value of the annual harvest is estimated to increase by $589,800, or 900 percent, compared to No Action levels. The economic sectors most affected by sportfishing activity are wholesale trade, retail trade, and lodging places. None of these sectors would be substantially impacted. Businesses that primarily cater to persons sportfishing for salmon in the ocean, including charter boat operators, marina operators, and other service providers near affected port areas, would substantially benefit from this alternative. Based on the predicted increase in sportfishing trips for salmon in the ocean and along the lower Klamath River, regional spending by persons sportfishing for salmon would increase by $1.3 million, or 40 percent, compared to No Action levels.

KMZ-Oregon Coastal Area: Under the Flow Evaluation Alternative, the KMZ-Oregon Coastal Area economy would benefit from increases in ocean commercial salmon harvests and sportfishing-related spending changes. These changes would result in annual regional industrial output increasing by $3.7 million (Table 3-55). This 0.4 percent increase in output would generate $1.6 million in place of work income and 58 jobs. These increases are not considered substantial.

Overall commercial fishing and seafood processing employment in the area would increase by an insubstantial 9 percent. The ocean commercial salmon fishing industry would experience substantial economic benefits under the alternative. The gross value of the annual harvest is estimated to increase by $492,000, or 900 percent, compared to No Action levels. The economic sectors most affected by sportfishing activity are wholesale trade, retail trade, and lodging places. None of these sectors would be substantially impacted. Businesses that primarily cater to persons sportfishing for salmon in the ocean, including charter boat operators, marina operators, and other service providers near affected port areas, would substantially benefit from this alternative. Regional spending by persons ocean sportfishing for salmon would increase by $3.0 million, or 66 percent, compared to No Action levels.

Northern / Central Oregon Coastal Area: Under the Flow Evaluation Alternative, the Northern / Central Oregon Coastal Area economy would benefit from increases in ocean commercial salmon harvests and sportfishing-related spending. These changes would result in annual regional industrial output increasing by $47.5 million (Table 3-55). This 0.2 percent increase in output would generate $17.9 million in place of work income and 559 jobs. These increases are not considered substantial.

Overall commercial fishing and seafood processing employment in the area would increase by a substantial 11 percent. The ocean commercial salmon fishing industry would experience substantial economic benefits under the alternative. The gross value of the annual harvest is estimated to increase by $4.3 million, or 50 percent, compared to No Action levels. The economic sectors most affected by sportfishing activity are wholesale trade, retail trade, and lodging places. None of these sectors would be substantially impacted. Businesses that primarily cater to persons sportfishing for salmon in the ocean, including charter boat operators, marina operators, and other service providers near affected port areas, would benefit from this alternative. Regional spending by persons ocean sportfishing for salmon would increase by $741,300, or 10 percent, compared to No Action levels. This change is not considered substantial.

2020 Social Impacts. There would be no social impacts to the Monterey Coastal and San Francisco Coastal Areas. In the Mendocino Coastal and Northern / Central Oregon Coastal Areas the increases in commercial fishing opportunities would be welcomed by those wishing to pursue this way of life. The substantial increase in employment in seafood processing and benefits to businesses supporting sportfishing for salmon would be viewed as positive by the affected port areas. In the KMZ-California Coastal and KMZ-Oregon Coastal Areas the substantial increase in benefits to businesses

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supporting sportfishing for salmon would be viewed as positive by the affected communities.

Central Valley.

2020 Economic Impacts.

Sacramento Valley: The Sacramento Valley would be affected by a negative change in M&I water supply, electricity costs, and agricultural production and net returns. The total loss in output would be $12.1 million, place of work income would be reduced by $6.6 million, and employment would be reduced by 160 persons (Table 3-56). These changes are not substantial compared to No Action levels. Relatively large effects occur in CVP service areas and in preference power areas, but these are not expected to be substantial. The most affected sectors are miscellaneous retail, eating and drinking establishments, and real estate.

(Under the Flow Evaluation Alternative, the Sacramento and San Joaquin Valleys) would be affected by a negative change in M&I water supply, electricity costs, and agricultural production and net returns.

San Joaquin Valley: The San Joaquin Valley would be affected by a negative change in M&I water supply, electricity costs, and agricultural production and net returns. The total loss in output would be $17.0 million, place of work income would be reduced by $9.0 million, and employment would be reduced by 270 persons (Table 3-56). These changes are not substantial. Relatively large effects occur in CVP service areas and in preference power areas, but these changes are not expected to be substantial. The most affected sectors are miscellaneous retail, farm machinery, cotton, and agricultural services.

Tulare Basin: The Tulare Basin would be affected by changes in agricultural production and net returns. The total reduction in output would be $9.9 million, place of work income would be reduced by $5.1 million, and employment would be reduced by 160 persons. These changes are not substantial compared to No Action levels. Relatively large effects on certain industries or areas may occur, but these are not expected to be substantial. The most affected sectors are miscellaneous retail and farm machinery.

The Tulare Basin would be affected by changes in agricultural production and net returns (under the Flow Evaluation Alternative).

2020 Social Impacts. There would be no substantial social impacts in the Central Valley under the Flow Evaluation Alternative.

Percent Inflow.

Trinity River Basin.

Up-front Impacts. The costs associated with the Percent Inflow Alternative are expected to generate an additional $1.2 million in output/sales, $630 thousand in income, and 21 jobs annually in Trinity County (Table 3-54). This reflects the maximum impact and is expected during the first 3 years of implementation. The majority of the impact stems from the construction of channel rehabilitation sites.

Impacts drop to zero starting in year 7. Given this level of job creation represents less than 1 percent of the projected total employment in Trinity County in 2001, the impact of these additional jobs is not substantial.

The jobs generated in any particular sector are expected to be so small as to not result in any substantial impacts at the individual sector level. The only relatively large cost element associated with this alternative is the construction of channel rehabilitation sites. While these activities would be concentrated along the Trinity River mainstem, they would be dispersed along the length of the river, implying a lack of concentrated regional economic impacts.

Annual Impacts.

2020 Economic Impacts: Under the Percent Inflow Alternative, the Trinity / Shasta County regional economy would be negatively affected by decreases in spending associated with declines in water-oriented recreation. Although recreation-related spending associated with use of Trinity Reservoir would increase, these effects would be more than offset by decreases in recreation-related spending associated with declines in use at Shasta Reservoir and along the Trinity River. Annual regional economic output would decrease by an estimated $500,000, place of work income would decrease by $300,000, and employment would decrease by 8 jobs (Table 3-54). These decreases, however, are not considered substantial. Revenues specific to businesses in Trinity County are estimated to increase by less than $10,000 annually.

Although recreation-related spending associated with use of Trinity Reservoir would increase (under the Percent Inflow Alternative), these effects would be more than offset by decreases in recreation-related spending associated with declines in use at Shasta Reservoir and along the Trinity River.

The economic sectors most affected by recreation activity are wholesale trade, retail trade, and lodging places. Annual employment in these sectors is estimated to decrease by 5 jobs, with 3 of those occurring in the retail trade sector. These impacts are not considered substantial.

Businesses that primarily cater to persons recreating at Trinity and Shasta Reservoirs, or along the Trinity River, would be most impacted by this alternative. These businesses include concessionaires, marina operators and other service providers at the reservoirs, and guiding and recreation services along the river. Adverse, but not substantial, impacts would be experienced by businesses that serve recreationists at Shasta Reservoir and along the Trinity River. Businesses that primarily serve persons recreating at Trinity Reservoir would experience a positive, but not substantial, impact.

2020 Social Impacts: There would be no substantial social changes in the Trinity River Basin under the Percent Inflow Alternative.

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Lower Klamath River Basin/Coastal Area.

2020 Economic Impacts.

Monterey Coastal Area: The Monterey Coastal Area would be unaffected by implementation of the Percent Inflow Alternative because this area has historically been less affected by restraints to protect Klamath River Basin salmon. Therefore, easing harvest restrictions on naturally produced Trinity River salmon would have little effect on the overall harvest in this region. No project-related changes in ocean commercial salmon harvests or sportfishing-related spending are expected within the region.

The Monterey Coastal Area would be unaffected by implementation of the Percent Inflow Alternative.

San Francisco Coastal Area: The San Francisco Coastal Area would be affected by a positive change in recreation and commercial fishing expenditure, by a negative change in M&I water supply, electricity costs, and agricultural production and net returns. The total loss in output would be $12.3 million, place of work income would be reduced by $6.4 million, and employment would be reduced by 120 persons (Table 3-55). These changes are not substantial. Relatively large effects on certain industries or areas may occur, but these are not expected to be substantial.

(Under the Percent Inflow Alternative), the San Francisco Coastal Area would be affected by a positive change in recreation and commercial fishing expenditure, by a negative change in M&I water supply, electricity costs, and agricultural production and net returns.

The ocean commercial salmon fishing and processing industry, and businesses that cater to persons sportfishing for salmon including charter boat operators, marina operators, and other service providers near port areas, would benefit from this alternative. The gross value of the annual commercial harvest of salmon would increase by $262,400 (4 percent), and regional spending by persons ocean sportfishing for salmon would increase by $117,000 (1 percent) compared to No Action levels. These increases are not substantial.

Mendocino Coastal Area: Under the Percent Inflow Alternative, the Mendocino Coastal Area economy would be beneficially affected by increases in ocean commercial salmon harvests and sportfishing-related spending. These changes would result in annual regional industrial output increasing by $4.9 million, place of work income increasing by $2.3 million, and employment increasing by 57 jobs (Table 3-55). These increases, which are 0.1 percent greater than No Action levels, are not considered substantial.

Overall commercial fishing and seafood processing employment in the area would increase by an insubstantial 7 percent. The ocean commercial salmon fishing industry would experience substantial economic benefits. The gross value of the annual harvest is estimated to increase by $1.1 million, or 260 percent, compared to No Action levels. The economic sectors most affected by sportfishing activity are wholesale trade, retail trade, and lodging places. None of these sectors would be substantially impacted. Businesses that

primarily cater to persons sportfishing for salmon in the ocean, including charter boat operators, marina operators, and other service providers near affected port areas, would benefit from this alternative. Regional spending by persons ocean sportfishing for salmon would increase by $615,300, or 19 percent, compared to No Action levels. This beneficial impact is not considered substantial.

KMZ-California Coastal Area: Under the Percent Inflow Alternative, the KMZ-California Coastal Area economy would benefit from increases in ocean commercial salmon harvests and sportfishing-related spending. These changes would result in annual regional industrial output increasing by $2.0 million (Table 3-54). This growth in output would generate $1.0 million in place of work income and 24 jobs. These increases, which represent less than 0.1 percent of No Action levels, are not substantial. Note that these impacts are understated since the analysis does not include the effects of changes in tribal harvest.

Overall commercial fishing and seafood processing employment in the area would increase by an insubstantial 1 percent. The ocean commercial salmon fishing industry would experience substantial economic benefits. The gross value of the annual harvest is estimated to increase by $424,600, or 700 percent, compared to No Action levels. The economic sectors most affected by sportfishing activity are wholesale trade, retail trade, and lodging places. None of these sectors would be substantially impacted. Businesses that primarily cater to persons sportfishing for salmon in the ocean, including charter boat operators, marina operators, and other service providers near affected port areas, would substantially benefit from this alternative. Based on the predicted increase in sportfishing for salmon in the ocean, and along the lower Klamath River, regional spending by persons sportfishing for salmon would increase by $1.1 million, or 32 percent, compared to No Action levels.

(Under the Percent Inflow Alternative, the Mendocino coastal Area, KMZ-Oregon, KMZ-California, and Northern/Central Oregon Areas' economies would benefit form increases in ocean commercial salmon harvests and sportfishing-related spending.)

KMZ-Oregon Coastal Area: Under the Percent Inflow Alternative, the KMZ-Oregon Coastal Area economy would benefit from increases in ocean commercial salmon harvests and sportfishing-related spending changes. These changes would result in annual regional industrial output increasing by $2.8 million (Table 3-55). This 0.3 percent increase in output would generate $1.2 million in place of work income and 45 jobs. These increases are not considered substantial.

Overall commercial fishing and seafood processing employment in the area would increase by an insubstantial 7 percent. The ocean commercial salmon fishing industry would experience substantial economic benefits. The gross value of the annual harvest is estimated to increase by $353,300, or 6,500 percent, compared to No Action levels. The economic sectors most affected by sportfishing

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activity are wholesale trade, retail trade, and lodging places. None of these sectors would be substantially impacted. Businesses that primarily cater to persons sportfishing for salmon in the ocean, including charter boat operators, marina operators, and other service providers near affected port areas, would substantially benefit from this alternative. Regional spending by persons ocean sportfishing for salmon would increase by $2.5 million, or 55 percent, compared to No Action levels.

Northern / Central Oregon Coastal Area: Under the Percent Inflow Alternative, the Northern / Central Oregon Coastal Area economy would benefit from increases in ocean commercial salmon harvests and sportfishing-related spending changes. These changes would result in annual regional industrial output increasing by $36.0 million (Table 3-55). This 0.1 percent increase in output would generate $13.6 million in place of work income and 423 jobs. These increases are not considered substantial.

(Under the Percent Inflow Alternative, the Sacramento and San Joaquin Valleys) would be affected by a negative change in M&I water supply, electricity costs, and agricultural production and net returns.

Overall commercial fishing and seafood processing employment in the area would increase by an insubstantial 8 percent. The ocean commercial salmon fishing industry would experience substantial economic benefits. The gross value of the annual harvest is estimated to increase by $3.2 million, or 40 percent, compared to No Action levels. The economic sectors most affected by sportfishing activity are wholesale trade, retail trade, and lodging places. None of these sectors would be substantially impacted. Businesses that primarily cater to persons sportfishing for salmon in the ocean, including charter boat operators, marina operators, and other service providers near affected port areas, would benefit. Regional spending by persons ocean sportfishing for salmon would increase by $581,800, or 8 percent, compared to No Action levels. These impacts are not considered substantial.

Social Impacts. In the KMZ-California and KMZ-Oregon Coastal Areas, the substantial increase in benefits to businesses for supporting sportfishing for salmon would be viewed as positive by the affected communities. In the remainder of the Lower Klamath River Basin / Coastal Area there would be no substantial changes under the Percent Inflow Alternative.

Central Valley.

2020 Economic Impacts.

Sacramento Valley: The Sacramento Valley would be affected by a negative change in M&I water supply, electricity costs, and agricultural production and net returns. The total loss in value of output would be $9.2 million, place of work income would be reduced by $5.0 million, and employment would be reduced by 130 persons

(Table 3-56). These changes are not substantial. Relatively large effects on certain industries or areas may occur, but these are not expected to be substantial.

San Joaquin Valley: The San Joaquin Valley would be affected by a negative change in M&I water supply, electricity costs, and agricultural production and net returns. The total loss in value of output would be $5.4 million, place of work income would be reduced by $2.9 million, and employment would be reduced by 90 persons (Table 3-53). These changes are not substantial. Relatively large effects on certain industries or areas may occur, but these are not expected to be substantial.

Tulare Basin: The Tulare Basin would be affected by changes in agricultural production and net returns. The total reduction in value of output would be $6.7 million, place of work income would be reduced $3.5 million, and employment would be reduced by 110 persons (Table 3-56). These changes are not substantial. Relatively large effects on certain industries or areas may occur, but these are not expected to be substantial.

The Tulare Basin would be affected by changes in agricultural production and net returns (under the Percent Inflow Alternative).

2020 Social Impacts. There would be no substantial changes in the Central Valley under the Percent Inflow Alternative.

Mechanical Restoration.

Trinity River Basin.

Up-front Impacts. The costs associated with the Mechanical Restoration Alternative are expected to generate an additional $2.1 million in output/sales, $1.1 million in income, and 37 jobs annually in Trinity County (Table 3-54). The majority of this impact stems from the combined cost of constructing the channel rehabilitation sites and the watershed protection program. Impacts taper off gradually until the channel rehabilitation sites are completed in year 6. At that point impacts decline by 50 percent and represent primarily the watershed protection program. Given the peak level of job creation represents less than 1 percent of the projected total employment in Trinity County in 2001, the total impacts associated with the alternative are not substantial. The jobs generated in any particular sector are expected to be so small as to not result in any substantial impacts at the individual sector level.

The alternative includes the following programs: watershed protection, construction of channel rehabilitation sites, maintenance of existing and new channel rehabilitation sites, and a mainstem dredging program. Given all of these activities are dispersed, it is unlikely that regional economic impacts would be geographically concentrated.

Annual Impacts.

2020 Economic Impacts: The Trinity / Shasta County regional economy would be positively affected by the Mechanical Restoration Alternative. The only changes in recreation-related spending would be associated with slight increases in use of the Trinity River for sportfishing. Annual regional economic output would increase by an estimated $110,000, place of work income would increase by $60,000, and employment would increase by 2 jobs (Table 3-54). These increases are not considered substantial. Revenues specific to businesses in Trinity County are estimated to increase by less than $50,000 annually.

Businesses that primarily cater to persons recreating at Trinity and Shasta Reservoirs, or along the Trinity River, would be most impacted by this alternative. These businesses include concessionaires, marina operators and other service providers at the lakes, and guiding and recreation services along the river. Positive, but not substantial, impacts would be experienced by businesses that serve recreationists along the Trinity River; businesses that serve persons recreating at Trinity and Shasta Reservoirs would not be affected.

The Monterey Coastal Area would be unaffected by implementation of the Mechanical Restoration Alternative.

2020 Social Impacts: There would be no substantial social changes in the Trinity River Basin under the Mechanical Restoration Alternative.

Lower Klamath River Basin/Coastal Area.

2020 Economic Impacts.

Monterey Coastal Area: The Monterey Coastal Area would be unaffected by implementation of the Mechanical Restoration Alternative because this area has historically been less affected by restraints imposed to protect Klamath River Basin salmon. Therefore, easing harvest restrictions on naturally produced Trinity River salmon would have little effect on the overall harvest in this region. No project-related changes in ocean commercial salmon harvests or sportfishing-related spending are expected within the region.

This Mechanical Restoration Alternative has no effect on agriculture, hydropower, or M&I water supply (in the San Francisco Coastal Area); however, sportfishing and commercial fishing are affected.

San Francisco Coastal Area: This Mechanical Restoration Alternative has no effect on agriculture, hydropower, or M&I water supply; however, sportfishing and commercial fishing are positively affected. The increase in value of production is $2.3 million, place of work income is increased by $0.9 million, and employment would be increased by 25 persons (Table 3-55). These effects are not substantial.

The ocean commercial salmon fishing and processing industry, and businesses that cater to persons sportfishing for salmon including charter boat operators, marina operators, and other service providers near port areas, would benefit from this alternative. The gross value

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of the annual commercial harvest of salmon is estimated to increase by $262,400 (4 percent), and regional spending by persons ocean sportfishing for salmon would increase by $117,000 (1 percent) compared to No Action levels. The changes are not substantial.

Mendocino Coastal Area: Under the Mechanical Restoration Alternative, the Mendocino Coastal Area economy would be beneficially affected by increases in ocean commercial salmon harvests and sportfishing-related spending. These changes would result in annual regional industrial output increasing by $4.3 million, place of work income increasing by $2.0 million, and employment increasing by 50 jobs (Table 3-55). These increases, which are less than 0.1 percent of No Action levels, are not substantial.

Overall commercial fishing and seafood processing employment in the area would increase by an insubstantial 7 percent. The ocean commercial salmon fishing industry would experience substantial economic benefits. The gross value of the annual harvest is estimated to increase by $928,900, or 23 percent, compared to No Action levels. The economic sectors most affected by sportfishing activity are wholesale trade, retail trade, and lodging places. None of these sectors would be substantially impacted. Businesses that primarily cater to persons sportfishing for salmon in the ocean, including charter boat operators, marina operators, and other service providers near affected port areas, would benefit. Regional spending by persons ocean sportfishing for salmon would increase by $564,200, or 18 percent, compared to No Action levels. This change is not substantial. Note that these impacts are understated since the analysis does not include the effects of changes in tribal harvest.

(Under the Mechanical Restoration Alternative, the Mendocino Coastal Area, KMZ-California, KMZ-Oregon, and Northern/Central Oregon Coastal Areas' economies would benefit from increases in ocean commercial salmon harvests and sportfishing-related spending.)

KMZ-California Coastal Area: Under the Mechanical Restoration Alternative, the KMZ-California Coastal Area economy would be beneficially affected by increases in ocean commercial salmon harvests and sportfishing-related spending. These changes would result in annual regional industrial output increasing by $1.9 million (Table 3-55). This growth in output would generate an increase of $0.9 million in place of work income and 23 jobs within the region. These increases, which represent less than 0.1 percent of No Action levels, are not substantial. Note that these impacts are understated since the analysis does not include the effects of changes in tribal harvest.

Overall commercial fishing and seafood processing employment in the area would increase by an insubstantial 1 percent. The ocean commercial salmon fishing industry would experience substantial economic benefits. The gross value of the annual harvest is estimated to increase by $404,000, or 600 percent, compared to No Action levels. The economic sectors most affected by sportfishing activity are wholesale trade, retail trade, and lodging places. None of

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these sectors would be substantially impacted. Businesses that primarily cater to persons sportfishing for salmon in the ocean, including charter boat operators, marina operators, and other service providers near affected port areas, would substantially benefit. Regional spending by persons sportfishing for salmon in the ocean and the lower Klamath River would increase by $1.0 million, or 30 percent, compared to No Action levels.

KMZ-Oregon Coastal Area: Under the Mechanical Restoration Alternative, the KMZ-Oregon Coastal Area economy would benefit from increases in ocean commercial salmon harvests and sportfishing-related spending. These changes would result in annual regional industrial output increasing by $2.6 million (Table 3-55). This 0.3 percent increase in output would generate an increase of $1.0 million in place of work income and 43 jobs within the region. These changes are not substantial.

Overall commercial fishing and seafood processing employment in the area would increase by an insubstantial 6 percent. The ocean commercial salmon fishing industry would experience substantial economic benefits. The gross value of the annual harvest would increase by $333,700, or 600 percent, compared to No Action levels. The economic sectors most affected by sportfishing activity are wholesale trade, retail trade, and lodging places. None of these sectors would be substantially impacted. Businesses that primarily cater to persons sportfishing for salmon in the ocean, including charter boat operators, marina operators, and other service providers near affected port areas, would substantially benefit. Regional spending by persons ocean sportfishing for salmon would increase by $2.5 million, or 53 percent, compared to No Action levels.

Northern/Central Oregon Coastal Area: Under the Mechanical Restoration Alternative, the Northern/Central Oregon Coastal Area economy would benefit from increases in ocean commercial salmon harvests and sportfishing-related spending. These changes would result in annual regional industrial output increasing by $35.7 million (Table 3-55). This 0.1 percent increase in output would generate $13.4 million in place of work income and 419 jobs. These increases are not substantial.

Overall commercial fishing and seafood processing employment in the area would increase by an insubstantial 8 percent. The ocean commercial salmon fishing industry would experience substantial economic benefits. The gross value of the annual harvest is estimated to increase by $3.1 million, or 40 percent, compared to No Action levels. The economic sectors most affected by sportfishing activity are wholesale trade, retail trade, and lodging places. None of these sectors would be substantially impacted. Businesses that primarily cater to persons sportfishing for salmon in the ocean, inclu-

ding charter boat operators, marina operators, and other service providers near affected port areas, would benefit. Regional spending by persons ocean sportfishing for salmon would increase by $560,700, or 8 percent, compared to No Action levels. This change is not substantial.

2020 Social Impacts. In the KMZ-California and KMZ-Oregon Coastal Areas, the increase in benefits to businesses supporting sportfishing for salmon would be viewed as positive by the affected communities. In the remainder of the Lower Klamath River Basin / Coastal Area there would not be any substantial changes under the Mechanical Restoration Alternative.

Central Valley.

2020 Economic Impacts.

Sacramento Valley: The Mechanical Restoration Alternative has no effect on Sacramento Valley agriculture, power, recreation, or M&I water supply. Therefore, there are no regional effects.

The Mechanical Restoration Alternative has no effect on (the Central Valley).

San Joaquin Valley: The Mechanical Restoration Alternative has no effect on San Joaquin Valley agriculture, power, recreation, or M&I water supply. Therefore, there are no regional effects.

Tulare Basin: The Mechanical Restoration Alternative has no effect on Tulare Basin agriculture, power, recreation, or M&I water supply. Therefore, there are not regional effects.

2020 Social Impacts. There would be no substantial social impacts to the Central Valley under the Mechanical Restoration Alternative.

State Permit.

Trinity River Basin.

Up-front Impacts. The additional costs associated with the State Permit Alternative as compared to No Action (i.e., increased spawning gravel costs due to Safety of Dam releases) were determined to be minor enough not to create noticeable regional impacts. The lack of up-front impacts associated with this alternative would hold for the sector-level comparison as well as the total comparison.

Annual Impacts.

2020 Economic Impacts: Under the State Permit Alternative, the Trinity / Shasta County regional economy would be negatively affected by decreases in spending associated with declines in Trinity River recreation. Although recreation-related spending associated with use of Trinity and Shasta Reservoirs would increase, these effects would be more than offset by decreases in recreation-related spending along the Trinity River. Annual regional economic output

Although recreation-related spending associated with use of Trinity and Shasta Reservoirs would increase (under the State Permit Alternative), these effects would be more than offset by decreases in recreation-related spending along the Trinity River.

would decrease by $5.9 million, place of work income would decrease by $3.5 million, and employment would decrease by 115 (Table 3-54) jobs. These changes are not substantial. Revenues specific to businesses in Trinity County are estimated to decrease by $1.8 million annually.

The economic sectors most affected by recreation activity are wholesale trade, retail trade, and lodging places. Annual employment in these sectors is estimated to decrease by 74 jobs, with 70 of those occurring in the retail trade and lodging sectors. The adverse impacts on the lodging sector are substantial.

Businesses that primarily cater to persons recreating at Trinity and Shasta Reservoirs, or along the Trinity River, would be most impacted by this alternative. These businesses include concessionaires, marina operators and other service providers at the reservoirs, and guiding and recreation services along the river. Beneficial but not substantial impacts would be experienced by businesses that serve recreationists at the reservoirs. Businesses that primarily serve persons recreating along the Trinity River would experience a substantial, adverse impact.

Under the State Permit Alternative, the Monterey Coastal Area economy would be adversely affected by reductions in ocean commercial salmon harvests and sportfishing-related spending changes.

2020 Social Impacts: Those losing jobs in lodging or in businesses serving recreationists along the Trinity River would have to obtain employment in different businesses or leave the area to secure employment.

Lower Klamath River Basin/Coastal Area.

2020 Economic Impacts.

Under the State Permit Alternative, the San Francisco Coastal Area would be affected by changes in sportfishing and commercial fishing expenditures, by changes in municipal water supply and electricity costs, and by changes in agricultural production and net returns.

Monterey Coastal Area: Under the State Permit Alternative, the Monterey Coastal Area economy would be adversely affected by reductions in ocean commercial salmon harvests and sportfishing-related spending changes because harvests in this region would be presumably restricted to protect naturally produced Trinity River salmon, which are assumed to be listed under the ESA because of poor habitat conditions under this alternative. These changes would result in annual regional industrial output decreasing by $13.3 million, place of work income decreasing by $5.4 million, and employment decreasing by 166 jobs (Table 3-55). These reductions, which are less than 0.1 percent of No Action levels, are not substantial.

Overall commercial fishing and seafood processing employment in this area is estimated to decrease by an insubstantial 13 percent and 2 percent, respectively. The ocean commercial salmon fishing industry would experience adverse economic effects. Reductions in salmon harvests would result in annual gross harvest revenues decreasing by $1.3 million, or 28 percent, compared to No Action levels. These changes are not substantial. The economic sectors most affected by sportfishing activity are wholesale trade, retail trade, and lodging places. None of these sectors would be substantially affected. Businesses that primarily cater to persons sportfishing for salmon in the ocean, including charter boat operators, marina operators, and other service providers near affected port areas, would be adversely impacted. Regional spending by persons ocean sportfishing for salmon would decrease by $647,700, or 6 percent, compared to No Action levels. This change is not substantial.

San Francisco Coastal Area: Under the State Permit Alternative, the San Francisco Coastal Area would be affected by positive changes in sportfishing and commercial fishing expenditures, by negative changes in M&I water supply, electricity costs, and agricultural production and net returns. The positive effects from increased M&I water supply, hydropower generation, and agricultural production exceed the negative effects from reduced fishing. The net increase in value of production would be $13.2 million, place of work income would increase by $7.9 million, and employment would increase by 110 persons (Table 3-55). These changes are not substantial.

The ocean commercial salmon fishing and processing industry, and businesses that cater to persons sportfishing for salmon including charter boat operators, marina operators, and other service providers near port areas, would be adversely affected. The gross value of the annual commercial harvest of salmon would decrease by $1.6 million (27 percent), and regional spending by persons ocean sportfishing for salmon would decrease by $791,200 (6 percent) compared to No Action levels. These decreases are not substantial.

Under the State Permit Alternative, the Mendocino Coastal Area economy would be adversely affected by decreases in ocean commercial salmon harvests and sportfishing-related spending.

Mendocino Coastal Area: Under the State Permit Alternative, the Mendocino Coastal Area economy would be adversely affected by decreases in ocean commercial salmon harvests and sportfishing-related spending. These changes would result in annual regional industrial output decreasing by $2.1 million, place of work income decreasing by $1.0 million, and employment decreasing by 25 jobs (Table 3-55). These reductions, which are less than 0.1 percent of No Action levels, are not substantial.

Overall commercial fishing and seafood processing employment in the area would decrease by an insubstantial 3 percent. The ocean commercial salmon fishing industry would experience substantial adverse economic effects. Based on the assumption that commercial

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salmon harvests would be eliminated in the region under this alternative, the gross value of the annual salmon harvest would decrease by $404,000 compared to No Action levels. The economic sectors most affected by sportfishing activity are wholesale trade, retail trade, and lodging places. None of these sectors would be substantially impacted. Businesses that primarily cater to persons sportfishing for salmon in the ocean, including charter boat operators, marina operators, and other service providers near affected port areas, would be adversely affected. Regional spending by persons ocean sportfishing for salmon would decrease by $2.6 million, or 27 percent, compared to No Action levels.

Under the State Permit Alternative, the KMZ-California Coastal Area economy would experience slight reductions in economic activity due to decreases in ocean commercial salmon harvests and sportfishing-related spending.

KMZ-California Coastal Area: Under the State Permit Alternative, the KMZ-California Coastal Area economy would experience slight reductions in economic activity due to decreases in ocean commercial salmon harvests and sportfishing-related spending. Annual regional industrial output would decrease by an estimated $300,000. This reduction in output would generate a $200,000 decrease in place of work income and the loss of 4 jobs (Table 3-55). These decreases, which represent less than 0.001 percent of No Action levels, are not substantial. Note that these impacts are understated since the analysis does not include the effects of changes in tribal harvest.

Overall commercial fishing and seafood processing employment in the area is estimated to decrease by an insubstantial 2 jobs. The ocean commercial salmon fishing industry would experience a substantial adverse economic impact due to the assumed closure of the ocean salmon fishery. The gross value of the annual harvest is estimated to decrease by $61,900, or 100 percent, compared to No Action levels. The economic sectors most affected by sportfishing activity are wholesale trade, retail trade, and lodging places. None of these sectors would be substantially impacted. Businesses that primarily cater to persons sportfishing for salmon in the ocean, including charter boat operators, marina operators, and other service providers near affected port areas, would be adversely affected. Regional spending by persons sportfishing for salmon in the ocean and lower Klamath River would decrease by $198,000, or 6 percent, compared to No Action levels. This change is not substantial.

Under the State Permit Alternative, the (KMZ-Oregon and Northern/Central Oregon Coastal Areas' economies) would experience reductions in ocean commercial salmon harvests and sportfishing-related spending.

KMZ-Oregon Coastal Area: Under the State Permit Alternative, the KMZ-Oregon Coastal Area economy would experience reductions in ocean commercial salmon harvests and sportfishing-related spending. These changes would result in annual regional industrial output decreasing by $500,000 (Table 3-55). This 0.06 percent decrease in output would cause an estimated $200,000 reduction in place of work income and the loss of 8 jobs. These changes are not substantial.

Overall commercial fishing and seafood processing employment in the area is estimated to decrease by an insubstantial 2 jobs. The ocean commercial salmon fishing industry would experience substantial reductions in salmon harvest revenues resulting from the assumed closure of the salmon fishery in the area. The gross value of the annual harvest would decrease by $54,200, or 100 percent, compared to No Action levels. The economic sectors most affected by sportfishing activity are wholesale trade, retail trade, and lodging places. None of these sectors would be substantially impacted. Businesses that primarily cater to persons sportfishing for salmon in the ocean, including charter boat operators, marina operators, and other service providers near affected port areas, would be adversely affected. Regional spending by persons ocean sportfishing for salmon would decrease by $524,000, or 11 percent, compared to No Action levels. This change is not substantial.

Northern / Central Oregon Coastal Area: Under the State Permit Alternative, the Northern / Central Oregon Coastal Area economy would experience reductions in ocean commercial salmon harvests and sportfishing-related spending. These changes would result in annual regional industrial output decreasing by $41.8 million (Table 3-55). This decrease, which is less than 1 percent of No Action levels, would cause a $15.8 million reduction in place of work income and the loss of 494 jobs. These changes are not substantial.

Overall commercial fishing and seafood processing employment in this area is estimated to decrease by an insubstantial 10 percent and 8 percent, respectively. The ocean commercial salmon fishing industry would experience substantial reductions in economic benefits. The gross value of the annual harvest in the region would decrease by $3.7 million, or 50 percent, compared to No Action levels. The economic sectors most affected by sportfishing activity are wholesale trade, retail trade, and lodging places. None of these sectors would be substantially impacted. Businesses that primarily cater to persons sportfishing for salmon in the ocean, including charter boat operators, marina operators, and other service providers near affected port areas, would be adversely affected. Regional spending by persons ocean sportfishing for salmon would decrease by $964,300, or 13 percent, compared to No Action levels. This change is not substantial.

2020 Social Impacts. There would be no substantial social impacts to the Lower Klamath River Basin / Coastal Area under the State Permit Alternative.

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Central Valley.

2020 Economic Impacts.

Sacramento Valley: Under the State Permit Alternative, the Sacramento Valley would be affected by negative changes in M&I water supply, electricity costs, and agricultural production and net returns. The total increase in output would be $9.8 million, place of work income would increase $5.2 million, and employment would increase by 130 persons (Table 3-56). No substantial adverse regional effects were identified.

Under the State Permit Alternative, (the Sacramento and San Joaquin Valleys) would be affected by negative changes in M&I water supply, electricity costs, and agricultural production and net returns.

San Joaquin Valley: Under the State Permit Alternative, the San Joaquin Valley would be affected by negative changes in M&I water supply, electricity costs, and agricultural production and net returns. The total increase in output would be $12.5 million, place of work income would increase $6.9 million, and employment would increase by 220 persons (Table 3-56). No substantial adverse regional effects were identified.

Tulare Basin: Under the State Permit Alternative, the Tulare Basin would be unaffected.

2020 Social Impacts. There would be no substantial social impacts to the Central Valley under the State Permit Alternative.

No Action versus Preferred Alternative.

Under the State Permit Alternative, the Tulare Basin would be affected.

Trinity River Basin.

Up-front Impacts. The Preferred Alternative consists of the Flow Evaluation Alternative plus the watershed protection component of the Mechanical Restoration Alternative. Therefore, all socioeconomic impacts associated with the Preferred Alternative, other than costs, are identical to those of the Flow Evaluation Alternative. The costs associated with the Preferred Alternative are expected to generate $2.1 million in output/sales, $1.1 million in income, and 37 jobs annually in Trinity County (Table 3-54). The majority of these impacts stem from the combined cost of constructing the channel rehabilitation sites and the watershed protection program. Impacts taper off gradually until the channel rehabilitation sites are completed in year 6. At that point, impacts decline by 50 percent and represent primarily the watershed protection program. Given the peak level of job creation represents less than 1 percent of the projected total employment in Trinity County in 2001, the total impacts associated with the Preferred Alternative are not substantial.

Since virtually all of the costs associated with the Preferred Alternative are likely to be dispersed, regional economic impacts would not be concentrated in any particular area.

The jobs generated in any particular sector are expected to be so small as to not result in any substantial impacts. Since virtually all of the costs associated with the Preferred Alternative are likely to be

dispersed, regional economic impacts would not be concentrated in any particular area.

Existing Conditions versus Preferred Alternative.

Trinity River Basin.

Economic Impacts.

Up-front Impacts: The overall change in the Trinity County economy from 1995 existing conditions to 2001 conditions under the Preferred Alternative was estimated at $8.5 million in output, $4.5 million in income, and 127 jobs (Table 3-54). Approximately 75 percent of this change is due to the projection from 1995 to 2001 and not to implementing the alternative. The cost impacts associated with the Preferred Alternative are $2.1 million in output/sales, $1.1 million in income, and 37 jobs. The majority of this impact stems from the combined cost of constructing the channel rehabilitation sites and the watershed protection program. Impacts taper off gradually until the channel rehabilitation sites are completed in year 6. At that point, impacts decline by 50 percent and represent primarily the watershed protection program. Given the peak level of job creation associated with the alternative represents less than 1 percent of the projected total employment in Trinity County in 1995, the total impacts associated with the Preferred Alternative are not substantial.

The jobs generated in any particular sector are expected to be so small as to not result in any substantial impacts at the individual sector level. Since virtually all of the costs associated with the Preferred Alternative are likely to be dispersed, regional economic impacts would not be concentrated in any particular area.

Under the Preferred Alternative, the Trinity/Shasta County regional economy would be positively affected by increases in spending associated with increases in water-oriented recreation.

Annual Impacts: Under the Preferred Alternative, the Trinity/Shasta County regional economy would be positively affected by increases in spending associated with increases in water-oriented recreation. Annual regional economic output would increase by $2.6 billion, place of work income would increase by $1.4 billion, and employment would increase by 35,900 jobs (Table 3-54). More than 99 percent of these changes in economic activity are attributable to the effects of increased population on recreation use and spending associated with the Trinity River and Trinity and Shasta Reservoirs. Project-related effects are not substantial.

The economic sectors most affected by recreation activity are wholesale trade, retail trade, and lodging places. Annual employment in these sectors is estimated to increase by about 9,600 jobs, with 6,850 of those occurring in the retail trade sector. Because nearly all of these job impacts are attributable to population changes that are not associated with the project, project-related effects are not considered substantial.

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Businesses that primarily cater to persons recreating at Trinity or Shasta Reservoirs, or along the Trinity River, would be positively impacted. These businesses include concessionaires, marina operators and other service providers at the reservoirs, and guiding and recreation services along the river. However, because most of these effects are attributable to population changes that are not associated with the project, project-related effects are not considered substantial.

Social Impacts. Social impacts would be similar to those between the No Action Alternative and the Flow Evaluation Alternative; however, additional jobs could be created as a result of the watershed protection work.

Lower Klamath River Basin/Coastal Area.

2020 Economic Conditions.

Monterey Coastal Area: Compared to modeled 1995 conditions, substantial economic growth would occur within the Monterey Coastal Area by 2020 under the Preferred Alternative. Regional output is projected to increase by $17.5 billion (Table 3-55). Similarly, place of work income is projected to increase by $9.9 billion, and a projected 241,980 additional jobs would be created. This growth, however, would be entirely related to the overall growth of the regional population and its economy, and not due to the Preferred Alternative. No changes in ocean commercial or sport salmon harvests are expected between 1995 and 2020 as a result of the Preferred Alternative.

Compared to modeled 1995 conditions, substantial economic growth would occur within the Monterey Coastal Area by 2020 under the Preferred Alternative.

San Francisco Coastal Area: Differences between 1995 conditions and 2020 conditions under the Preferred Alternative are largely caused by population increases, and not implementation of the project. The gross value of the annual commercial salmon harvest is estimated to increase by $262,400, or 4 percent, and regional spending by persons ocean sportfishing for salmon would increase by $3.0 million, or 29 percent, compared to 1995 levels (Table 3-55). Because more than 90 percent of this increased sportfishing-related spending is due to the effect of population growth, the project-related effects are not considered substantial.

Differences between 1995 conditions and 2020 conditions under the Preferred Alternative are largely caused by population increases, and not implementation of the project.

Mendocino Coastal Area: Compared to modeled 1995 conditions, the Mendocino Coastal Area economy would be beneficially affected by increases in ocean commercial salmon harvests and sportfishing-related spending in 2020 under the Preferred Alternative. Employment in the commercial fishing and seafood processing sectors is estimated to increase by 29 and 27 jobs, respectively, by 2020 (Table 3-55). These changes represent increases of approximately 16 percent over modeled 1995 conditions. These increases are considered substantial. The gross value of the annual harvest is estimated to increase by $2.1 million, or 500 percent, from modeled 1995

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conditions to 2020 conditions under the Preferred Alternative. Businesses that primarily cater to persons sportfishing for salmon in the ocean, including charter boat operators, marina operators, and other service providers near affected port areas, would substantially benefit from the Preferred Alternative. Regional spending by persons ocean sportfishing for salmon would increase by $1.7 million, or 65 percent, compared to 1995 levels. Because more than half of this increase is related to the project, project-related effects are considered substantial.

KMZ-California Coastal Area: Compared to modeled 1995 conditions, the KMZ-California Coastal Area economy would be beneficially affected by increases in ocean commercial salmon harvests and sportfishing-related spending in 2020 under the Preferred Alternative. Employment in the commercial fishing and seafood processing sectors is estimated to increase by 7 and 6 jobs, respectively, by 2020 (Table 3-55). These changes represent increases of 1.3 percent over modeled 1995 conditions. These increases are not considered substantial. Note that these impacts are understated since the analysis does not include the effects of changes in tribal harvest. The gross value of the annual harvest is estimated to increase by $589,800, or 900 percent, from modeled 1995 conditions to 2020 conditions under the Preferred Alternative. Businesses that primarily cater to persons sportfishing for salmon in the ocean, including charter boat operators, marina operators, and other service providers near affected port areas, would substantially benefit from the Preferred Alternative. Regional spending by persons ocean sportfishing for salmon would increase by $1.9 million, or 68 percent, compared to 1995 levels. Because more than 60 percent of this increased spending is related to the project, project-related effects are considered substantial.

KMZ-Oregon Coastal Area: Compared to modeled 1995 conditions, the KMZ-Oregon Coastal Area economy would benefit from increases in ocean commercial salmon harvests and sportfishing-related spending by 2020 under the Preferred Alternative. Employment in the commercial fishing and seafood processing sectors is estimated to increase by 12 and 8 jobs, respectively, by 2020 (Table 3-55). These changes represent increases of 9 percent over modeled 1995 conditions. These increases are considered less than substantial. The gross value of the annual harvest is estimated to increase by $492,000, or 900 percent, from modeled 1995 conditions to 2020 conditions under the Preferred Alternative. Businesses that primarily cater to persons sportfishing for salmon in the ocean, including charter boat operators, marina operators, and other service providers near affected port areas, would substantially benefit from the Preferred Alternative. Regional spending by persons ocean sportfishing for salmon would increase by $3.4 million, or 68 percent,

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compared to 1995 levels. Because about 90 percent of this increase is related to the project, project-related effects are considered substantial.

Northern / Central Oregon Coastal Area: Compared to 1995 modeled conditions, the Northern / Central Oregon Coastal Area economy would benefit from increases in ocean commercial salmon harvests and sportfishing-related spending by 2020 under the Preferred Alternative. Employment in the commercial fishing and seafood processing sectors is estimated to increase by 102 and 168 jobs, respectively, by 2020 (Table 3-55). These changes represent increases of 11 percent over modeled 1995 conditions. These increases are considered substantial. The gross value of the annual harvest is estimated to increase by $4.3 million, or 50 percent, from modeled 1995 conditions to 2020 conditions under the Preferred Alternative. Businesses that primarily cater to persons sportfishing for salmon in the ocean, including charter boat operators, marina operators, and other service providers near affected port areas, would benefit from the Preferred Alternative. Regional spending by persons ocean sportfishing for salmon would increase by $1.8 million, or 30 percent, compared to 1995 levels. Because about 60 percent of this increase is related to the effect of population growth on ocean salmon sportfishing, project-related effects are not considered substantial.

Social Impacts. Social impacts would be similar to those between the No Action Alternative and the Flow Evaluation Alternative.

Central Valley.

2020 Economic Impacts.

The differences between 1995 conditions and conditions in 2020 under the Preferred Alternative (in the Central Valley) are largely caused by population increases, and not due to the project.

Sacramento Valley: The differences between 1995 conditions and conditions in 2020 under the Preferred Alternative are largely caused by population increases, and not due to the project (Table 3-56).

San Joaquin Valley: The differences between 1995 conditions and conditions in 2020 under the Preferred Alternative are largely caused by population increases, and not due to the project (Table 3-56).

Tulare Basin: The differences between 1995 conditions and conditions in 2020 under the Preferred Alternative are largely caused by population increases, and not due to the project (Table 3-56).

Social Impacts. Social impacts would be similar to those between the No Action Alternative and the Flow Evaluation Alternative.

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TABLE 3-54

Trinity River Basin Region (Defined as Trinity and Shasta Counties for These Analyses)

Time of Impact/ Impact Measures/ Economic Sectors	Units	Comparison Bases		Action Alternatives						
		Existing Conditions	No Action Alternative	Maximum Flow	Flow Evaluation	Percent Inflow	Mechanical Restoration	State Permit	Preferred Alternative	
				Change from No Action Alternative in 2020						Change from Existing Conditions
Up-front Impacts		**Year 1995 Totals**	**Year 2001 Totals**							
Output/Sales	M$	344.2	350.6	6.2/5.5/3.6[a]	1.28	1.23	2.14	0	2.14	8.54
Income	M$	186.1	189.5	2.95/2.65/1.75[a]	0.66	0.63	1.11	0	1.10	4.5
Employment	Jobs	4,955	5,045	77/70/45[a]	22	21	37	0	37	127
Most Impacted Sectors:										
Construction	Jobs	375	380	18/16/11	0	0	0	0	0	5
Wholesale trade	Jobs	105	105	7/6/4[a]	1	1	2	0	2	2
Eating & drinking	Jobs	225	230	8/7/4[a]	3	3	5	0	5	10
Auto & service stations	Jobs	55	55	11/10/6[a]	0	0	0	0	0	0
Annual Impacts		**Year 1995 Totals**	**Year 2020 Totals**							
Output/Sales	M$	6,078.2	8,693.7	-6.3	3.2	-0.5	-0.11	-5.9	3.2	2,618.7
Income	M$	3,377.4	4,830.7	-2.6	2.0	-0.3	-0.06	-3.5	2.0	1,455.3
Employment	Jobs	83,280	119,110	-66	66	-8	2	-115	66	35,896
Most Impacted Sectors:										
Wholesale trade	Jobs	4,900	7,010	-9	2	-1	0	-4	2	2,112
Retail trade	Jobs	15,880	22,710	-25	21	-3	1	-38	21	6,851
Lodging places	Jobs	1,440	2,060	-5	20	-1	1	-32	20	640

[a]Three estimates reflect dam modification options. See Section 2.1.3.
M$ = million dollars.

TABLE 3-55
Lower Klamath River Basin/Coastal Area Regions

Impact Subregion/Impact Measures/Economic Sectors	Units	Comparison Bases		Action Alternatives						
		Existing Conditions (1995)	No Action Alternative (2020)	Maximum Flow	Flow Evaluation	Percent Inflow	Mechanical Restoration	State Permit	Preferred Alternative	
				Change from No Action Alternative in 2020						Change from Existing Conditions
Monterey Coastal Area										
Total output	M$	34,214.6	51,714.2	0	0	0	0	-13.3	0	17,499.6
Income	M$	19,297.0	29,166.8	0	0	0	0	-5.4	0	9,869.8
Employment	Jobs	473,210	715,190	0	0	0	0	-166	0	241,980
Most Impacted Sectors:										
Commercial fishing	Jobs	210	210	0	0	0	0	-27	0	0
Seafood processing	Jobs	2,450	2,450	0	0	0	0	-57	0	0
Wholesale trade	Jobs	18,920	28,600	0	0	0	0	-8	0	9,680
Retail trade	Jobs	77,010	116,390	0	0	0	0	-24	0	39.380
Lodging places	Jobs	12,390	18,720	0	0	0	0	-2	0	6,330
San Francisco Coastal Area										
Total output	M$	351,700	430,900	-159.6	-32.6	-12.3	2.28	13.2	-32.6	79,167
Income	M$	199,900	245,000	-79.2	-16.2	-6.4	0.91	7.9	-16.2	45,084
Employment	Jobs	3,652,600	4,560,500	-1,540	-310	-120	25	110	-310	907,590
Most Impacted Sectors:										
Vegetables	Jobs	1,423	1,776	-165	-1	-9	0	27	-1	352
Canned fruit and vegetables	Jobs	3,281	4,097	-125	-24	-7	0	21	-24	792
Retail and wholesale trade	Jobs	746,600	932,218	-327	-65	-30	6	21	-65	185,553
Services	Jobs	1,154,925	1,441,977	-420	-85	-41	6	38	-85	286,967
Commercial Fishing	Jobs	1,276	1,593	3	0	-3	3	-20	0	317
Mendocino Coastal Area										
Total output	M$	3,111.5	4,267.1	11.1	9.6	4.9	4.3	-2.1	9.6	1,165.2
Income	M$	1,560.4	2,140.0	5.1	4.4	2.3	2.0	-1.0	4.4	584.0
Employment	Jobs	43,630	59,835	127	110	57	50	-25	110	16,315

TABLE 3-55
Lower Klamath River Basin/Coastal Area Regions

Impact Subregion/Impact Measures/Economic Sectors	Units	Comparison Bases		Action Alternatives						
		Existing Conditions (1995)	No Action Alternative (2020)	Maximum Flow	Flow Evaluation	Percent Inflow	Mechanical Restoration	State Permit	Preferred Alternative	
				Change from No Action Alternative in 2020						Change from Existing Conditions
Most Impacted Sectors:										
Commercial fishing	Jobs	180	180	33	29	14	13	-5	29	29
Seafood processing	Jobs	180	180	31	27	13	12	-5	27	27
Wholesale trade	Jobs	1,360	1,870	6	5	3	2	-1	5	515
Retail trade	Jobs	8,130	11,150	18	15	8	7	-5	15	3,035
Lodging places	Jobs	1,710	2,350	2	2	1	1	-1	2	642
KMZ-California Coastal Area										
Total Output	M$	5,086.9	6,072.5	3.0	2.9	2.0	1.9	-0.3	2.9	988.5
Income	M$	2,752.4	3,285.7	1.5	1.5	1.0	0.9	-0.2	1.5	534.8
Employment	Jobs	73,760	88,050	37	36	24	23	-4	36	14,326
Most Impacted Sectors:										
Commercial fishing	Jobs	520	520	8	7	5	5	-1	7	7
Seafood processing	Jobs	460	460	7	6	4	4	-1	6	6
Wholesale trade	Jobs	3,210	3,830	2	2	2	1	0	2	622
Retail trade	Jobs	13,820	16,490	8	8	5	5	-1	8	2,678
Lodging places	Jobs	1,390	1,650	2	2	1	1	0	2	262
KMZ-Oregon Coastal Area										
Total Output	M$	572.4	848.4	3.9	3.7	2.8	2.6	-0.5	3.7	279.7
Income	M$	289.9	429.7	1.7	1.6	1.2	1.0	-0.2	1.6	141.4
Employment	Jobs	9,100	13,490	62	58	45	43	-8	58	4,448
Most Impacted Sectors:										
Commercial fishing	Jobs	130	130	13	12	9	8	-1	12	12
Seafood processing	Jobs	110	110	9	8	6	6	-1	8	8
Wholesale trade	Jobs	330	490	4	3	3	3	0	3	163
Retail trade	Jobs	2,080	3,080	18	17	14	13	-3	17	1,017
Lodging places	Jobs	500	740	3	3	3	2	-1	3	243

TABLE 3-55
Lower Klamath River Basin/Coastal Area Regions

Impact Subregion/Impact Measures/Economic Sectors	Units	Comparison Bases		Action Alternatives						
		Existing Conditions (1995)	No Action Alternative (2020)	Maximum Flow	Flow Evaluation	Percent Inflow	Mechanical Restoration	State Permit	Preferred Alternative	
				Change from No Action Alternative in 2020						Change from Existing Conditions
Northern/Central Oregon Coastal Area										
Total output	M$	20,757.5	27,094.0	51.1	47.5	36.0	35.7	-41.8	47.5	6,384.0
Income	M$	10,549.2	13,768.8	19.3	17.9	13.6	15.4	-15.8	17.9	3,237.5
Employment	Jobs	290,960	379,760	601	559	423	419	-494	559	89,559
Most Impacted Sectors:										
Commercial fishing	Jobs	900	900	109	102	77	74	-89	102	102
Seafood processing	Jobs	1,730	1,730	181	168	127	127	-147	168	168
Wholesale trade	Jobs	11,260	14,700	36	34	26	26	-30	34	3,474
Retail trade	Jobs	56,410	73,630	92	86	65	64	-77	86	17,306
Lodging places	Jobs	6,370	8,320	6	5	4	4	-5	5	1,955

M$ = million dollars.

TABLE 3-56
Central Valley Regions

Impact Subregion/Impact Measures/Economic Sectors	Units	Comparison Bases		Action Alternatives						
		Existing Conditions (1995)	No Action Alternative (2020)	Maximum Flow	Flow Evaluation	Percent Inflow	Mechanical Restoration	State Permit	Preferred Alternative	
				Change from No Action Alternative in 2020						Change from Existing Conditions
Sacramento Valley										
Total output	M$	104,900	168,800	-50.6	-12.1	-9.2	0	9.8	-12.1	63,888
Income	M$	61,100	98,300	-27.6	-6.6	-5	0	5.2	-6.6	37,193
Employment	Jobs	1,413,400	2,137,600	-700	-160	-130	0	130	-160	724,200
Most Impacted Sectors:										
Rice milling	Jobs	1,106	1,672	-2	-1	0	0	1	-1	565
Retail and wholesale trade	Jobs	250,962	379,549	-146	-34	-29	0	29	-34	128,553
Farm machinery and equipment	Jobs	566	857	-19	-5	-2	0	2	-5	286
Miscellaneous retail	Jobs	37,640	56,925	-125	-32	-15	0	15	-32	19,253
San Joaquin Valley										
Total output	M$	82,700	154,900	-94.7	-17.0	-5.4	0	12.5	-17.0	72,183
Income	M$	41,700	78,200	-50.1	-9.0	-2.9	0	6.9	-9.0	36,491
Employment	Jobs	1,017,500	1,812,100	-1,510	-270	-90	0	220	-270	794,330
Most Impacted Sectors:										
Cotton	Jobs	6,557	11,678	-69.7	-12.4	-3.4	0	-1	-12	5,109
Retail and wholesale trade	Jobs	167,627	298,549	-208.1	-37.9	-13.8	0	30	-38	130,884
Farm machinery and equipment	Jobs	783	1,394	-112.6	-21.0	-6.1	0	20	-21	590
Miscellaneous retail	Jobs	26,349	46,928	-561.5	-104.7	-30.8	0	101	-105	20,474
Tulare Basin										
Total output	M$	41,600	78,200	-28.0	-9.9	-6.7	0	0	-9.9	36,590
Income	M$	20,700	38,800	-14.4	-5.1	-3.5	0	0	-5.1	18,095

TABLE 3-56
Central Valley Regions

Impact Subregion/Impact Measures/Economic Sectors	Units	Comparison Bases		Action Alternatives						
		Existing Conditions (1995)	No Action Alternative (2020)	Maximum Flow	Flow Evaluation	Percent Inflow	Mechanical Restoration	State Permit	Preferred Alternative	
				Change from No Action Alternative in 2020						Change from Existing Conditions
Employment	Jobs	534,600	945,800	-440	-160	-110	0	0	-160	411,040
Most Impacted Sectors:										
Cotton	Jobs	7,813	13,823	-24.8	-6.8	-4.5	0	0	-6.8	6,003
Retail and wholesale trade	Jobs	77,185	136,558	-57.5	-20.2	-12.1	0	-4.5	-20.2	59,353
Farm machinery and equipment	Jobs	375	664	-37.4	-16.1	-12.6	0	-6.5	-16.1	273
Miscellaneous retail	Jobs	26,349	46,924	-158.5	-67.8	-52.3	0	-26.9	-67.8	20,507

M$ = million dollars.

3.12 Cultural Resources

This section describes the prehistory, ethnography, and history of the Trinity River Region and reports the results of a cultural resources records search. This information provides a general context for understanding the importance, origin, and types of cultural resources that are located in the project area. The Trinity River Basin is the focus of this section because the project is not expected to affect cultural resources in out-of-basin or coastal areas.

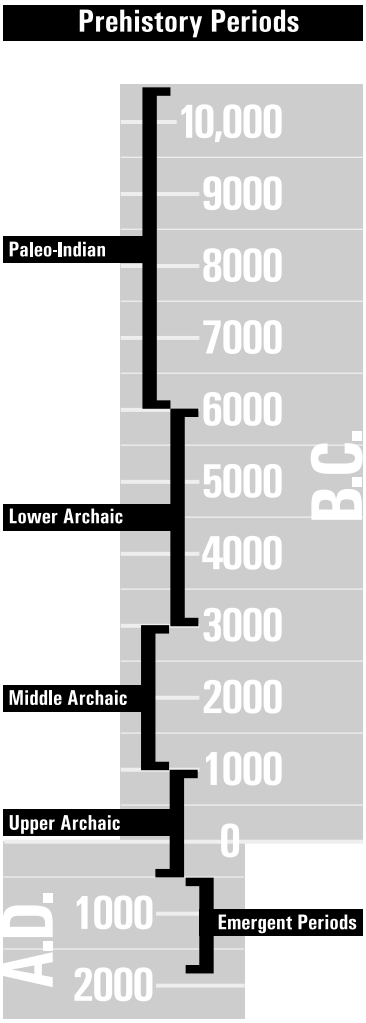
Affected Environment.

Five periods of prehistory have been described for the region encompassing the project area (i.e., the northwest coastal region of California). These periods are the Paleo-Indian (10,000-6000 B.C.), Lower Archaic (6000-3000 B.C.), Middle Archaic (3000-1000 B.C.), Upper Archaic (1000 B.C.-A.D. 500), and Emergent Periods (A.D. 500-1800). These periods are characterized by their "pattern," a term that refers to a culture's technology as revealed by the type and sophistication of its tools. These tools include points, which are made of stone or bone and used as weapons for hunting or fishing, and stone metates and manos used to grind seeds, and mortars and pestles used to grind acorns.

The area surrounding Trinity Reservoir and the Trinity River to its confluence with the Klamath River was inhabited by the Wintu, Chimariko, Yurok, and Hupa Indians at the time of Euro-american contact (see also the Tribal Trust section).

Wintu. At the time of Euro-american contact, most of the western side of the Sacramento Valley north of about Suisun Bay was inhabited by Wintun-speaking people. Early in the anthropological study of the region, Powers (1976) had recognized a linguistic and cultural distinction between the southern membership of this large group (i.e., the Patwin) and the people occupying the northern half of the western valley. Subsequent linguistic analyses resulted in the present division of Wintuan into a southern Patwin group, a Central (Nomlaki) group, and a northern (Wintu) Wintuan stock. Clearly, however, the central and northern Wintus were very closely related and shared numerous cultural traits and attributes.

The Wintu were divided into nine subgroups distributed from Cottonwood Creek in the south, northward through Shasta County and into portions of Trinity and Siskiyou Counties, and westward into portions of southern Trinity and northern Tehama Counties. Within the project area, the Wintu inhabited all areas east of approximately Junction City, including the area of what is now Trinity Reservoir.



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The area surrounding Trinity Reservoir and the Trinity River to its confluence with the Klamath River was inhabited by the Wintu, Chimariko, Yurok ,and Hupa Indians at the time of Euro-american contact.

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Wintu subsistence was based on three main staples: deer, acorns, and salmon. All three were abundant along the Sacramento and Trinity Rivers and their primary tributaries, although acorns and deer were available only seasonally. These staples were supplemented with an immense array of less abundant resources, some seasonally available and some procurable year round.

The available ethnographic information documents a complex pattern of land use, settlement, and subsistence orientation. The salmon runs, the locations of seasonally available big game (especially deer), and the distribution of acorn-yielding oak trees required major forays from the home base because all three were concentrated in different areas. Moreover, long and arduous trips were often required to collect non-native raw materials, such as obsidian and certain other utilitarian materials.

Chimariko. The Chimariko lived in a 20-mile-long reach of the Trinity River extending from approximately Big Bar to the confluence with the South Fork. Although the Chimariko language is now extinct, early ethnographers recorded some words, and the language is thought to be of Hokan stock. Sources for ethnographic information about the Chimariko include Driver (1939), Powers (1976), Dixon (1910), Harrington and Merriam (1967), and Kroeber (1925). These sources are summarized by Silver (1978), and that summary provides the basis for the following discussion.

The Chimariko lived in an area with abundant natural resources. The staples of their diet were salmon and acorns; but deer, elk, bear, pine nuts, seeds, berries, roots, and small mammals were also important food sources. Little is known of Chimariko social organization because their culture was destroyed at an early date. The largest social unit was the village. Each village had a headman, which was a hereditary, lifelong position passed through the male line. Status in Chimariko society was attained through wealth or a combination of wealth and birth. Only fragmentary data on Chimariko religion and myths exist.

Yurok. The Yurok inhabited California's northwestern coastline from Little River to Damnation Creek. Yurok ancestral territory also extended along the Klamath River from the mouth up past the Klamath-Trinity confluence to Slate Creek. Yurok territory extended 6 miles up the Trinity River. The Yurok language (and the neighboring Wiyot language) is affiliated with the Algonquin linguistic stock. Algonquin languages are primarily spoken by tribes residing in the Great Lakes and New England areas. While the Yurok language is still spoken fluently by several dozen Yurok people, a tribal language program is in place to increase the fluency of its tribal members. Traditional subsistence animal species include salmon, ocean fish,

sturgeon, sea lion, whale, elk, deer, and duck. Acorns, berries, bulbs, and grass seed are staple plant foods.

Yurok life is defined by extended families affiliated with villages and represented by head spokespersons. Ceremonial wealth and rights to subsistence resource areas determine familial standing within Yurok social structure. Yurok are recognized for their highly stylized art forms and their skills in making redwood canoes, weaving fine baskets, hunting, and especially, riverine salmon fishing. The ancient traditions are continued through contemporary times.

Hupa. The Hupa inhabited the area surrounding the lower reaches of the Trinity River from approximately Salyer to approximately within 6 miles of the confluence with the Klamath River. Linguistically, Hupa is considered a dialect of the Hupa language, Athapaskan family, Na-Dene stock. The Hupa relied heavily on salmon and acorns as food sources but also used other fish, nuts, seeds, roots, deer, elk, rodents, and fowl. No insects, amphibians, or reptiles (except turtles) were eaten.

As with many native groups of the California northwest, the Hupa had no formal chief or ruling council, but were ruled by individuals with prestige based on wealth. Wealth was defined in terms of the possession of nonsubsistence goods (usually imported items) gained by such means as trade, gambling, and indemnities. The highest political entity was the village. The Hupa excelled in woodworking and basket making (twined basketry). They also made plank houses and sweathouses, wooden chests, bowls, seats, and other objects. Wooden platforms, weirs, or harpoons were used for fishing. The Hupa used redwood canoes that they procured in trading with the Yurok.

History. In 1828, Jedediah Smith and his party of explorers were apparently the first white men to visit the Trinity River Basin (earlier excursions by Europeans had been made to the coast and Klamath Basin). Although the area was first used extensively by trappers, by the late 1840s gold mining was a major activity along the Trinity River. State Route 299 follows the trail used by trappers and gold miners traveling from Redding to Weaverville on their way to the Trinity River gold fields. Weaverville became a center of gold mining activity after 1849, but numerous mining camps and settlements were established all along the river. Many of the earliest miners were German immigrants, but Chinese immigrants moved into the area in large numbers beginning in 1853. Much of the Trinity River continued to be used for mining throughout the first half of the 20th century. Large-scale dragline and bucket dredging operations occurred along many stretches of the Trinity River and a number of its tributaries beginning in 1939 and, along with other mining

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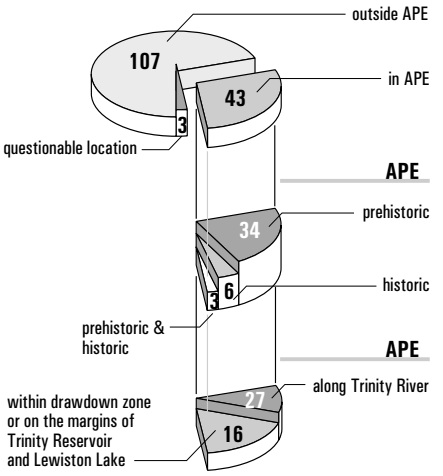
activities, continued into the 1960s. Logging has occurred throughout the historic period.

The area of potential effect (APE) was defined as the 500-year floodplain along the Trinity River and the drawdown zone of the Trinity Reservoir and Lewiston Lake.

Known Cultural Resources. A cultural resources records search (Class I Archaeological Survey) was conducted at information centers of the California Archaeological Inventory at California State University-Chico, and at Sonoma State University at Rohnert Park. The records search focused on known cultural resources at Trinity Reservoir and along the Trinity River from Trinity Reservoir to the Hoopa Valley Indian Reservation. The study area was defined as including 1/8 mile on both sides of the river and the inundation zone of Trinity Reservoir and Lewiston Lake. The area of potential effect (APE) was defined as the 500-year floodplain along the Trinity River and the drawdown zone of the Trinity Reservoir and Lewiston Lake. The location of all the sites in the study area that are recorded on information center and Reclamation maps was transferred to 7.5-minute U.S. Geological Survey (USGS) topographical maps. Site record forms for each known site were copied. A site typology and database were created for sorting by site type, location, temporal period, and condition.

Cultural Resources in Area of Potential Effect



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Because most of the APE has not been subjected to intensive cultural resource surveys (Class III Archaeological Survey), many additional unidentified cultural resources, including prehistoric and historic archaeological sites, architectural resources, and traditional cultural properties, may be present. Other known sites may not have been incorporated into the information centers' files.

Results. The records search resulted in the identification of 153 recorded cultural resources in the study area. Many of the sites were recorded over 30 years ago, and their current condition is unknown. These cultural resources consist of 20 types of prehistoric and historic sites. The sites and their associated features range from prehistoric Native American villages, camps, and lithic scatters to historic Native American sites, mines, ditches, cabins, undifferentiated structural remains, a school, USFS stations and campgrounds, a telephone line, cemeteries, a rock wall, trails, a wagon road, and a bridge. Of these, 43 appear to be in the APE, 107 appear to be outside of the APE, and the remaining 3 have questionable locations. Fifty-one sites outside of the APE are inundated below or near the elevation of the permanent pool of Trinity Reservoir and Lewiston Lake. Nine sites within the APE have been previously destroyed by gold dredging and construction.

Of the sites that appear to be in the APE, 6 are historic, 3 have historic and prehistoric components, and the remaining are prehistoric. Of these sites in the APE, 27 are located along the Trinity River and the remaining are located within the drawdown zone or on the margins of Trinity Reservoir and Lewiston Reservoir. Only a few of

the sites have been evaluated for listing on the National Register of Historic Places (NRHP).

Environmental Consequences.

Methodology. This section evaluates impacts on cultural resources within the Trinity River Basin. Impacts on cultural resources within the Lower Klamath River Basin/Coastal Area and the Central Valley were considered to be less than significant because ground-disturbing activities would not occur in these areas, and changes in hydrologic conditions at reservoirs and rivers would be very small. Although it is theoretically possible that diminished water supplies in certain portions of the Central Valley might eventually affect long-term land use patterns, and that certain currently undisturbed areas might get disturbed, the prospect that there would be resultant negative effects on significant cultural resources is extremely speculative, and cannot be predicted with any level of certainty or probability.

Each project alternative was evaluated to determine how it could affect different types of cultural resources within the Trinity River Basin. Impacts on cultural resources could occur during the process of restoring spawning gravels, modifying the outlet facilities at Trinity Dam, and modifying river flows and reservoir levels included as part of some alternatives. Impacts associated with restoring spawning gravels and modifying outlet facilities were evaluated by comparing the location of the sites identified by the records search with maps showing the location and size of the rehabilitation sites. Hydrologic effects were evaluated by comparing changes in reservoir elevation (using PROSIM) and river flow under each alternative. However, because of the programmatic nature of this DEIS/EIR with regard to the channel rehabilitation projects, spawning gravel placement, watershed enhancement, and other site-specific activities associated with some of the alternatives, site-specific surveys and environmental documentation would be required prior to the actual implementation of these activities. (See Mitigation at the end of this section.)

Impacts on cultural resources within the Lower Klamath River Basin/Coastal Area and the Central Valley were considered to be less than significant because ground-disturbing activities would not occur in these areas, and changes in hydrologic conditions at reservoirs and rivers would be very small.

Significance Criteria. Significance criteria were developed based on a resource's eligibility for listing in the NRHP and CEQA. A cultural resource is considered significant in accordance with the National Historic Preservation Act (NHPA) if it is evaluated and found to be eligible for listing in the NRHP. Significant impacts to these resources can occur when prehistoric or historic archaeological sites, structures, or objects listed or eligible for listing in the NRHP are subjected to the following effects:

- Physical destruction or alteration of all or part of the property.
- Isolation of the property from or alteration of the property's setting when that character contributes to the property's qualification for NRHP listing.
- Introduction of visual, audible, or atmospheric elements that are out of character with the property or alter its setting.
- Neglect of a property resulting in its deterioration or destruction.
- Transfer, lease, or sale of the property.

Portions of the project area may be determined to be not subject to compliance with Section 106 of the NHPA. In this case, regulatory compliance in relation to cultural resources would be governed by CEQA. The CEQA Guidelines define a significant cultural resource as "a resource listed or eligible for listing on the California Register of Historical Resources" (Pub. Res. Code Section 5024.1). A resource may be eligible for inclusion in the California Register of Historical Resources (CRHR) if it:

- Is associated with events that have made a significant contribution to the broad patterns of California's history and cultural heritage.
- Is associated with the lives of persons important in our past.
- Embodies the distinctive characteristics of a type, period, region, or method of construction; or represents the work of an important creative individual; or possesses high artistic values.
- Has yielded, or may be likely to yield, information important to an understanding of prehistory or history.

According to the state CEQA Guidelines, an impact is considered significant if a project would have an effect that could change the significance of the resource. Demolition, replacement, substantial alteration, and relocation are actions that would change the significance of a historical resource.

Demolition, replacement, substantial alteration, and relocation are actions that would change the significance of a historical resource.

No Action. Under the No Action Alternative, the present operation of the TRD would continue. Because the hydrologic characteristics associated with river flows and reservoir-level fluctuations would not change, no changes in the characteristics of cultural resources within the inundation zone of Trinity Reservoir or along the Trinity River would occur.

Maximum Flow. The increased frequency in reservoir fluctuations and the greater variation in reservoir levels under the Maximum Flow Alternative could result in cultural resources within the inundation zone being more frequently exposed to wave action and

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wet / dry cycling. This exposure could result in a significant impact to a cultural resource.

The records search conducted for this project indicates the presence of historic and prehistoric cultural resource sites along the Trinity River. Although inundation maps are not available for the entire length of the Trinity River, it is unlikely that the 30,000-cfs peak flows could have major impacts on cultural resource sites given that prior to the construction of the dam, historical peaks were 70,000 cfs or greater. Therefore, the existing cultural resource sites along the banks of the river are assumed to have been previously inundated and substantially damaged.

Modification of the Trinity Dam outlet works would be necessary to accommodate the 30,000-cfs peak flows (see Chapter 2). This modification would include ground-disturbing activities at the base of Trinity Dam. A review of the records search indicates that no known sites are located at or in the immediate vicinity of Trinity Dam. Because construction activities would be restricted to areas that were extensively disturbed during construction of Trinity Dam, no impacts on cultural resources are expected as part of modifying the outlet works.

Flow Evaluation. Trinity Reservoir levels would be lower than levels under the No Action Alternative in all months. The increased frequency of water levels fluctuations compared to No Action could result in increased exposure of cultural resources within the inundation zone. Such an impact could be significant.

The records search conducted for this project indicates the presence of historic and prehistoric cultural resource sites along the Trinity River. Sites within the area that would be inundated by the 11,000-cfs peak flows could be damaged as a result of erosion. A review of inundation maps for the reach of the river from Lewiston Dam to Douglas City (California Department of Water Resources, 1997) indicates that the 11,000-cfs peak flows could submerge cultural sites along the river. Although inundation maps are not available for the entire length of the Trinity River, it is unlikely that the 11,000-cfs peak flows could have major impacts on cultural resource sites given that prior to the construction of the dam, historical peaks were 70,000 cfs or greater. Therefore, the existing cultural resource sites along the banks of the river are assumed to have been previously inundated and substantially damaged.

The Flow Evaluation Alternative includes construction of 47 channel rehabilitation projects on the reach of the Trinity River between Lewiston Dam and the confluence with the North Fork. These rehabilitation projects would cover approximately 665 acres between RM 73 and 111. Restoration would include the construction of

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restored areas parallel to the mainstem in existing high-flow channels along historic gravel and cobble bars, introduction of spawning gravels, and construction of roads to provide access to some of the sites.

Although none of the known cultural resource sites would be directly affected by the proposed channel rehabilitation activities, operation of heavy equipment and other ground-disturbing activities, such as dredge-spoil placement, could damage previously unknown cultural resources located adjacent to the rehabilitation sites. Such an impact would be significant. Final assessment of these potential effects will be possible when detailed construction plans are developed and Class III cultural resource surveys can be conducted. (See Mitigation at the end of this section).

Percent Inflow. Trinity Reservoir levels would be slightly lower in winter months than under the No Action Alternative and nearly the same in summer months. Greater variation was observed in October and February. The greater variation in reservoir levels under the Percent Inflow Alternative could result in significant impacts to cultural resources due to increased frequency of exposure.

Although none of the known cultural resource sites were found to be directly affected by the proposed 47 channel rehabilitation activities, the effects to cultural resource sites by ancillary activities, such as dredge-spoil placement and equipment access, have not been analyzed at this time. Final assessment of these potential effects will be possible when detailed construction plans are developed and Class III cultural resource surveys can be conducted. Impacts to ancillary areas containing important cultural resources would be a significant impact. (See Mitigation at the end of this section.)

Mechanical Restoration. Under the Mechanical Restoration Alternative, operation of Trinity Reservoir would be the same as under the No Action Alternative. The average monthly reservoir levels and reservoir-level fluctuations would not change from conditions under the No Action Alternative. No impacts on cultural resources within the inundation zone of Trinity Reservoir are expected because the frequency with which sites are inundated would be the same as under the No Action Alternative.

The construction of the 47 channel rehabilitation projects could result in significant impacts to previously unknown cultural resources during project construction. Although none of the known cultural resource sites were found to be directly affected by the proposed channel rehabilitation activities, the effects to cultural resource sites by ancillary activities, such as dredge-spoil placement and equipment access, have not been analyzed at this time. Additionally, ground-disturbing activities associated with the watershed

enhancement component of this alternative could also result in significant impacts to cultural resources depending on the location of the proposed enhancement effort and presence of resources. Final assessment of these potential effects will be possible when detailed construction plans are developed and Class III cultural resource surveys can be conducted. (See Mitigation at the end of this section.)

State Permit. Trinity Reservoir levels would be slightly higher during all months than under the No Action Alternative and nearly the same in summer months. Some variation was observed in October and January compared to the No Action Alternative.

The greater variation in reservoir levels under the State Permit Alternative could result in significant impacts to cultural resources due to increased frequency of exposure.

Impacts to cultural resources in the river associated with decreased flows would be less than significant.

Existing Conditions versus Preferred Alternative. Implementation of the Preferred Alternative could result in some impacts to existing cultural resources, similar to the impacts described in the Flow Evaluation Alternative (compared to the No Action Alternative). Because the Preferred Alternative also includes the watershed protection component from the Mechanical Restoration Alternative, there is the potential for additional ground-disturbing activities in the uplands. While most of these activities (e.g., road decommissioning) would likely occur on previously disturbed sites, significant impacts to cultural resources could occur depending on the location and associated potential presence of historic sites or artifacts.

Mitigation. Site-specific environmental reviews would be conducted prior to all ground-disturbing activities. The following mitigation measures, consisting of inventory, evaluation, and treatment processes, would be conducted by Reclamation as part of the environmental reviews to ensure compliance with Section 106 of the NHPA. Coordination will continue with the relevant tribes, including the Hoopa Valley and Karuk Tribes. Mitigation measures that would reduce impacts of the project to less than significant levels are:

…mitigation measures, consisting of inventory, evaluation, and treatment processes, would be conducted by Reclamation as part of the (site-specific) environmental reviews…

- **Conduct Class III cultural resources surveys of sites in the project area that have not been surveyed**. Before any ground disturbance takes place in the project area (including areas of ancillary activities, such as staging areas, gravel mining areas, access routes, or watershed enhancement projects), Class III cultural resource surveys covering the APE would be conducted to locate and record cultural resources.
- **Plan activities to avoid known cultural resources**. Before carrying out ground-disturbing activities, areas that have been

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delineated as containing cultural resources would be demarcated, and all ground-disturbing or related activities would be planned to avoid these areas.

- **Evaluate significance of resources that cannot be avoided**. If cultural resources cannot be avoided through careful planning of the activities associated with the alternative, additional research or test excavations (as appropriate) would be undertaken to determine whether the resources meet NRHP and/or CEQA significance criteria.

- **Develop treatment process to mitigate effects of project upon significant resources**. Impacts on significant resources that cannot be avoided would be mitigated in a manner that is deemed appropriate for the particular resource. 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.

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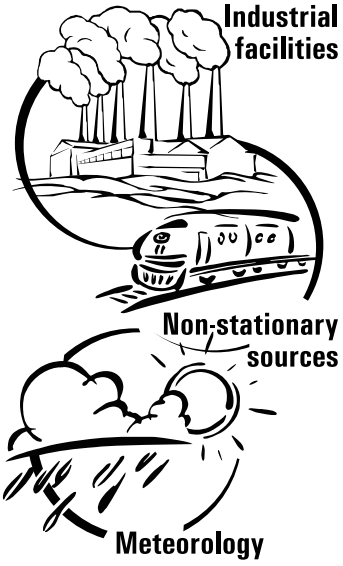
3.13 Air Quality

Air quality within each of the three geographic impact areas is influenced by a number of factors including stationary sources such as industrial facilities, non-stationary sources such as vehicles, and the meteorology of a given area. The potential for air quality impacts from the implementation of any of the alternatives is presented below for each alternative.

Affected Environment.

Air Quality Factors



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Trinity River Basin. The Trinity River Basin lies within the North Coast Air Basin (NCAB), which is under the jurisdiction of the North Coast Unified Air Quality Management District (NCUAQMD). The air quality of the Trinity River Basin meets the national Ambient Air Quality Standards (AAQS) for all criteria pollutants. However, it is designated non-attainment by the state with respect to particulate matter less than 10 microns in aerodynamic diameter (PM_{10}) in the Weaverville area during winter months, primarly from residential wood heating. Other sources of PM_{10} in the Trinity River Basin include motor vehicle exhaust, forest management / waste burning, and fugitive road dust.

Lower Klamath River Basin / Coastal Area. The Lower Klamath River Basin / Coastal Area is also in the NCUAQMD. However, because of the rural nature of the Lower Klamath River Basin / Coastal Area, the attainment status has not been classified for many state and federal criteria pollutants.

Central Valley. The Central Valley lies within the Northern Sacramento Valley Air Basin, the Southern Sacramento Valley Air Basin, the San Francisco Bay Area Air Basin (a portion), the Mountain Counties Air Basin (a portion), and the San Joaquin Air Basin. Many of the air pollutants existing within these air basins are associated with the four basic land uses generally occurring in the Central Valley: irrigated agriculture, dryland (dry cropped, fallow, idle, or grazed) agriculture, M&I, and undeveloped (natural). The primary pollutants associated with all four land uses include particulate matter and hydrocarbons or organic gases that may serve as ozone precursors. Pollutants commonly associated with agricultural land uses include PM_{10}, carbon monoxide (CO), nitrogen oxides (NO_x), and ozone (O_3) precursors. PM_{10} results from field burning and farm operations such as tilling, plowing, and the operation of farm equipment on loose earth, as well as entrained road dust releases and fuel combustion in vehicles and farm equipment.

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Environmental Consequences.

Methodology. Heavy equipment activities related to channel rehabilitation projects, spawning gravel placement, watershed protection, and modification of Trinity Dam are sources of potential air quality impacts. These impacts would generally have two components: (1) PM_{10} emissions from vehicles on unpaved roads and from ground-disturbing activities and (2) increased emissions from vehicle exhaust. These potential impacts were assessed qualitatively. Vehicle exhaust could be significant for projects requiring a large number of construction vehicles. Because the rehabilitation sites would not require a large number of vehicles (typically fewer than 30), the impact of vehicle exhaust is not considered further.

Changes to agricultural land uses in the Central Valley caused by reduced surface-water supplies (as described in the Land Use section) are assumed to be made consistent with existing land management practices, including the planting of a cover crop on fallowed lands to reduce wind erosion. Accordingly, no Central Valley impacts are anticipated or discussed below with regard to potential increases in PM_{10} concentrations.

It was considered too speculative to conclude that reduced agricultural water supplies will translate into development pressures that ultimately lead to air quality impacts from motor vehicles and other sources. Any changes in development patterns would be subject to local discretionary land use decisions, which would also be subject to CEQA. The outcome of any such decisions is too speculative to predict. Accordingly, no Central Valley impacts are anticipated or discussed below with regard to air quality from conversion of agricultural land to other uses.

Changes to air quality as a result of increased use of fossil fuels is discussed in Power Resources and Cumulative Impacts and is considered significant.

Significance Criteria. Impacts on air quality would be significant if they would result in any of the following:

- Violate any AAQS
- Substantially contribute to an existing or projected air quality violation
- Expose sensitive receptors to substantial pollutant concentrations
- Conflict with or obstruct implementation of any applicable air quality plan
- Violate any air quality standard or contribute substantially to an existing or projected violation

- Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is in nonattainment under an applicable federal or state ambient air quality standard (including releasing emissions that exceed quantitative thresholds for ozone precursors, as set by an air pollution control district or air quality management district)
- Expose sensitive receptors to substantial pollutant concentrations
- Create objectionable odors affecting a substantial number of people

No Action. Some increase in PM_{10} emissions could occur as the result of mechanical maintenance of the existing channel rehabilitation sites and the procurement, transport, and deposition of spawning gravel requiring the use of existing or new access. These impacts are not considered significant

Maximum Flow. This alternative does not rely on heavy equipment to create or maintain channel rehabilitation sites; therefore, increases in PM_{10} emissions would be limited to spawning gravel placement. Because of the large volumes of spawning gravel, emissions associated with this activity would be greater than under the No Action Alternative. These impacts are considered potentially significant.

Flow Evaluation. This alternative includes the construction of 47 channel rehabilitation sites, which would require the use of various equipment. Increases in PM_{10} levels would be potentially significant for any sites requiring use of existing or new access roads. Increases in PM_{10} levels (compared to No Action Alternative) resulting from spawning gravel placement would also occur because of the increased volumes of gravel. Air quality impacts would be short term, local, and potentially significant.

Percent Inflow. This alternative includes the construction of 47 channel rehabilitation sites, which would require the use of various equipment. Increases in PM_{10} levels would be significant for any sites requiring use of existing or new access roads. Air quality impacts would be short term, local, and potentially significant

To the extent that global warming and climate change is occurring due to fossil fuel combustion, any increase in fossil fuel emissions as a result of this alternative would contribute to that effect.

Mechanical Restoration. This alternative includes the construction of 47 channel rehabilitation sites, which would require the use of various equipment. In addition, this alternative uses mechanical means to maintain the sites, which could also require heavy equipment. Potential increases in PM_{10} levels would be potentially significant for any sites requiring use of existing or new access roads.

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This alternative could also generate short-term PM_{10} emissions as the result of the watershed protection work (e.g., road decommissioning); however, the work could reduce emissions in the long term. Air quality impacts would be short term, local, and potentially significant.

State Permit. This alternative does not include mechanical maintenance or construction of channel rehabilitation sites; hence, there would be no PM_{10} emissions associated with these activities. Emissions associated with spawning gravel placement would be short term and local, similar to those under the No Action Alternative.

Existing Conditions versus Preferred Alternative. Implementation of the Preferred Alternative could result in potentially significant short-term air quality impacts compared to existing conditions. Short-term impacts could occur as a result of the channel rehabilitation projects described in the Flow Evaluation Alternative. In addition, short-term and localized impacts could occur as a result of the watershed protection component of the Preferred Alternative (see the Mechanical Restoration Alternative). Air quality impacts would be short term, local, and potentially significant.

Mitigation. Site-specific environmental reviews would be conducted for all non-flow activities, e.g., channel rehabilitation projects, watershed protection projects, and spawning gravel placement. The following mitigation would be implemented as a part of those activities, thereby reducing PM_{10} emissions to less than significant level:

- Equipment and manual watering would be conducted on all stockpiles, dirt/gravel roads, and exposed or disturbed soil surfaces, as necessary, to reduce airborne dust.
- The contractor or agency would designate a person to monitor dust control and to order increased watering as necessary to prevent transport of dust offsite. The person would also respond to citizen complaints.

3.14 Environmental Justice

Executive Order 12898, "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations," dated February 11, 1994, requires agencies to identify and address 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. Environmental justice addresses the fair treatment of people of all races and incomes with respect to actions affecting the environment. Fair treatment implies that no group of people should bear a disproportionate share of negative impacts from an environmental action. To comply with the environmental justice policy established by the Secretary, all DOI agencies are to identify and evaluate any anticipated effects, direct or indirect, from the proposed project, action, or decision on minority and low-income populations and communities, including the equity of the distribution of the benefits and risks. Accordingly, this section examines the anticipated impacts associated with the alternatives with respect to potentially affected minority and economically disadvantaged groups.

Executive Order 12898 requires (federal) agencies to identify and address disproportionately high and adverse human health or environmental effects of their actions on minorities and low-income populations and communities.

Affected Environment. In 1989 over 35 percent of the populations of both (the Hoopa Valley and Yurok) reservations were living in poverty.

A high concentration of Native Americans live in the Trinity and Klamath River Basins, particularly along the Trinity and lower Klamath Rivers. Thus, any environmental effects could have a large and potentially disproportionate impact on this minority group. A primary concern regarding possible adverse impacts on the region's Native American populace is that they are already affected by low incomes, poverty, and high unemployment. According to the 1990 Census, average per-capita incomes on the Hoopa Valley and Yurok Reservations were $6,671 and $8,375 respectively, well below the per-capita incomes of residents of Trinity and Humboldt Counties and the state of California—$13,113, $15,498, and $16,409, respectively (U.S. Bureau of the Census, 1993; U.S. Bureau of Economic Analysis, 1990). Corresponding to low per-capita incomes are the high levels of poverty and unemployment. It is estimated that in 1989 over 35 percent of the populations of both reservations were living in poverty, which is more than twice the poverty levels of surrounding counties, and more than three times that of the state (U.S. Bureau of the Census, 1993). In 1993, unemployment among Hoopa Valley and Yurok tribal members living on or adjacent to their reservations was 64 and 75 percent, respectively (not accounting for underemployment) (U.S. Department of the Interior, BIA, 1993). In that same year, unemployment for all of Trinity County was 16.3 percent; for

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Humboldt County it was 9.8 percent (California Employment Development Department, 1994).

Counties in the Central Valley, such as Tulare (28.2), Merced (25.9), and Fresno (25.2), have percents of population in poverty substantially higher than California (16.5) and the United States (13.8). Counties near San Francisco Bay tend to have lower percents of population in poverty. People of Hispanic descent make up about one-third of most Central Valley county populations and African Americans about 5 percent. The percentage of people of Asian / Pacific Islander descent increases near the Bay.

Environmental Consequences.

Methodology. The analysis of Native American environmental justice impacts examined the extent to which each alternative would restore Native American access to Trinity River resources. As Native American socioeconomic opportunities in the Trinity and Klamath River Basins are tied directly to river system health (e.g., commercial and subsistence fishing, recreation, etc.), the alternatives were evaluated based on riverine health measures (see Sections 3.2, 3.5, and 3.7) and tribal trust analyses (see Section 3.6).

For all other potentially affected groups, Census Bureau data were used to identify counties with minority populations greater than 40 percent, and of those, counties with percentages of population in poverty higher than the state. Using substantial employment and income impacts identified in these counties in the socioeconomics section (see Section 3.11), potential environmental justice impacts for the affected counties were evaluated.

No Action.

Trinity River Basin and Lower Klamath River Basin/Coastal Area. Under the No Action Alternative, the Trinity River is projected to have in the year 2020 only 8 percent of the attributes of a healthy alluvial river. Thus, the alternative would have negative environmental justice implications for the Native American people of the Trinity and Klamath River Basins. The alternative would not repair the existing inequities in their access to Trinity River resources. There would be no substantial environmental justice impacts to non-Native American groups.

Central Valley. There would be no substantial environmental justice impacts in the Central Valley under the No Action Alternative.

Maximum Flow.

Trinity River Basin and Lower Klamath River Basin/Coastal Area. Implementation of the Maximum Flow Alternative would have substantial positive impacts on the Hoopa Valley, Yurok, and other

tribes in the Trinity and Klamath River Basins. Restoring the Trinity River's attributes to 81 percent of those present in a healthy alluvial river would improve the river's fisheries, water quality, riparian habitat, and other resources, with associated benefits in the lower Klamath River. This would greatly improve tribal access to many trust resources, to the significant benefit of their communities. Thus, this alternative would have very large, positive environmental justice implications for Native American communities in the region.

With the exception of the San Francisco Coastal Area, there would be no substantial environmental justice impacts to non-Native Americans in the Trinity River Basin and Lower Klamath River Basin / Coastal Area. In the San Francisco Coastal Area the impacts on agriculture would be concentrated in the Santa Clara Valley. The demographics of Santa Clara County indicate that the alternative would have substantial environmental justice impacts. In 1996, the minority and Hispanic populations were 47 and 23 percent, respectively, of the county's population, with over 80 percent of the farm workers in the county being of Hispanic descent.

Central Valley. Substantial agricultural impacts would occur in the Tehama-Colusa service area. This area includes Glenn, Colusa, and Yolo Counties. Based on Census Bureau data, 18.7, 17.3, and 15.5 percent, respectively, of the people in these counties live below the poverty level, compared to 16.5 and 13.8 percent, respectively, for the state of California and the United States. Only Colusa County has a minority population greater than 40 percent. With impacts being specific to the agricultural sector, and most of the farm workers being Hispanic, the loss of jobs by Hispanic farm workers in Colusa County would be a substantial environmental justice impact.

Substantial agricultural impacts would occur along the San Luis Canal for those users entirely dependent on CVP contracts. This includes the counties of Merced and Madera. Census Bureau data indicate that both counties have significant minority populations, low median incomes, and high percentages of people in poverty (25.9 and 20.8 percent, respectively). Therefore, the substantial impacts to agriculture would have substantial environmental justice impacts in these two counties.

In the Tulare Basin, substantial adverse impacts to agricultural employment and income in those communities dependent on irrigated agriculture using CVP contract water could have environmental justice impacts in the affected communities. According to 1996 Census Bureau data, Kern, Kings, and Tulare Counties had minority populations greater than 40 percent and high percentages of population in poverty at 20.6, 22.3, and 28.2 percent, respectively. Over 80 percent of the farm workers in each of the counties are Hispanic.

Flow Evaluation.

Trinity River Basin and Lower Klamath River Basin/Coastal Area. Implementation of the Flow Evaluation Alternative would have substantial positive impacts on the Hoopa Valley, Yurok, and other tribes in the Trinity and Klamath River Basins. Restoring the Trinity River's attributes to 66 percent of those present in a healthy alluvial river would improve the river's fisheries, water quality, riparian habitat, and other resources, with associated benefits in the lower Klamath River. This would greatly improve tribal access to many trust resources, to the significant benefit of their communities. Thus, this alternative would have very large, positive environmental justice implications for Native American communities in the region. There would be no substantial environmental justice impacts to non-Native Americans in the region.

Central Valley. There would be no substantial environmental justice impacts in the Central Valley under the Flow Evaluation Alternative.

Percent Inflow.

Trinity River Basin and Lower Klamath River Basin/Coastal Area. The Percent Inflow Alternative would lead to a marginal improvement in the health of the Trinity River system compared to the No Action Alternative. The improvement in the river's health should increase tribal access to fish and other trust assets dependent on Trinity River conditions. Nonetheless, this alternative falls well short of having positive environmental justice implications for the region's Native Americans. There would be no substantial environmental justice impacts to non-Native Americans in the region.

Central Valley. There would be no substantial environmental justice impacts in the Central Valley under the Percent Inflow Alternative.

Mechanical Restoration.

Trinity River Basin and Lower Klamath River Basin/Coastal Area. The Mechanical Restoration Alternative would result in a small improvement in the health of the Trinity River compared to the No Action Alternative and, accordingly, should lead to a marginal improvement in Native American access to Trinity River fish and other economically important resources. However, given how little of the region's riverine resources are currently accessible to Native American communities, overall, this alternative would have negative environmental justice implications for these people. There would be no substantial environmental justice impacts to non-Native Americans in the region.

Central Valley. There would be no substantial environmental justice impacts in this region under the Mechanical Restoration Alternative.

State Permit.

Trinity River Basin and Lower Klamath River Basin/Coastal Area. The State Permit Alternative would reduce flows in the Trinity River well below current levels, causing the river's health to decline even more than under the No Action Alternative. Thus, the alternative would have even greater negative environmental justice implications for the Native American people of the Trinity and Klamath River Basins. Although substantial negative impacts could occur in the wholesale and retail trade and lodging sectors in Shasta and Trinity Counties, there would not be any substantial environmental justice impacts.

Central Valley. There would not be substantial environmental justice impacts in the Central Valley under the State Permit Alternative.

Existing Conditions versus Preferred Alternative.

Trinity River Basin and Lower Klamath River Basin/Coastal Area. Environmental justice impacts would be similar to those between the Flow Evaluation Alternative and the No Action baseline.

Central Valley. Environmental justice impacts would be similar to those between the Flow Evaluation Alternative and the No Action baseline.

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