3.9 Land Use

Land use within the Trinity River Basin, Lower Klamath River Basin / Coastal Area, and Central Valley varies greatly due to the differences in population, economy, and environment. Land use within the Trinity River Basin and the lower Klamath River watershed is greatly influenced by the large amount of public and Indian lands, much of which is used for timber production and other natural resource related uses. Private uses along the Trinity and Klamath Rivers are generally limited to scattered residential development. Land use within the Central Valley is more diverse, but is dominated by agriculture and M&I uses. This section describes the residential / M&I, agriculture, and real estate land uses that may be impacted by the alternatives. Plans and policies that affect, or may be affected by, the alternatives are discussed in the Water Resources (3.3) and Recreation (3.8) sections.

Private uses along the Trinity and Klamath Rivers are generally limited to scattered residential development. Land use within the Central Valley is more diverse, but is dominated by agriculture and M&I uses.

3.9.1 Residential/Municipal and Industrial

Affected Environment. The affected environment for the residential / M&I discussion includes the Trinity River Basin and the Lower Klamath River Basin / Coastal Area. It also includes those portions of the Central Valley (including the Bay Area) served or otherwise affected by CVP M&I contract supplies.

Trinity River Basin. The Trinity River Basin is comprised of the majority of Trinity County and the easternmost portion of Humboldt County. Most of the Hoopa Valley Indian Reservation is within the basin (Figure 3-41). The largest town in the region is Weaverville, followed by Hoopa, Hayfork, and Lewiston. Trinity County had a population of 13,400 in 1995. Humboldt County had a larger population (124,500 for 1995); however, the portion of the county within the Trinity River Basin is very lightly populated. Throughout the watershed, residential, commercial, and industrial uses tend to be concentrated on relatively flat areas near the Trinity River or its tributaries, as with the population centers of Weaverville, Hayfork, Lewiston, Willow Creek, and Hoopa. Together, these communities house two-thirds of the basin's 15,000 people.

Development potential of most of the land in the watershed is restricted by topography, public ownership, Timber Production Zone zoning (which applies to most private land), and by county and tribal planning policies that guide development towards already developed areas and discourage development on resource lands. Several small communities exist along State Highway 299 on level terrain adjacent to the Trinity River. This development has been primarily residential in nature, typified by scattered single-family residences and mobile homes. Much of this residential development has encroached on the river's floodplain and some of its tributaries. Accordingly, flooding of some homes and bridges occurs during heavy storm events. Trinity County no longer allows development within the 100-year floodplain of the Trinity River.

Small water diversions within the watershed serve a variety of uses including M&I, domestic, irrigation, agricultural, and mining. The majority of the diversions are located along the Trinity River around the population centers of Junction City, Douglas City, and Willow Creek. Other diversions are located on tributaries such as the South Fork, Hayfork Creek, Canyon Creek, New River, and Weaver Creek. The Trinity River Basin does not receive CVP M&I contract supplies.

The Hoopa Valley Indian Reservation is located north of Willow Creek along the Trinity River and State Highway 96. The reservation is approximately 144 square miles, with the northern border lying near Weitchpec at the confluence of the Klamath River (see the Tribal Trust section [3.6] for more information).

Traffic conditions in the Trinity River Basin are generally free-flowing, with limited congestion. The primary route in the area is State Highway 299, which roughly follows the Trinity River from the Trinity Reservoir area west to Willow Creek in Humboldt County. Other highways in the Trinity River Basin include State Highway 96, which follows the Trinity River from Willow Creek north, through the Hoopa Valley Indian Reservation, to the Klamath River confluence, and State Highway 3, which roughly follows the west side of Trinity Reservoir. Traffic volume at various locations in the Trinity River Basin are described in Table 3-39.

TABLE 3-39
Traffic Volume in the Trinity River Basin

Route	Location	ADT[a]	Peak Hour
96	Weitchpec	740	70
96	Hoopa Reservation, north boundary	2,600	240
96	Hoopa Reservation, south boundary	3,700	350
299	Willow Creek, Highway 96 junction	5,300	560
299	Burnt Ranch Road	2,450	250
299	Near Helena (MP 31.45)	2,600	300
299	Weaverville, west city limits	4,000	390
299	Douglas City	4,500	310
299	New Lewiston Rd./Trinity Dam Blvd.	4,900	360
3	Weaverville, north of U.S. 299	4,400	390
3	Rush Creek Road	1,450	130

[a] ADT is the average daily traffic for the month of heaviest traffic flow.
Source: Caltrans, Traffic and Vehicle Data Systems Unit, 1998.

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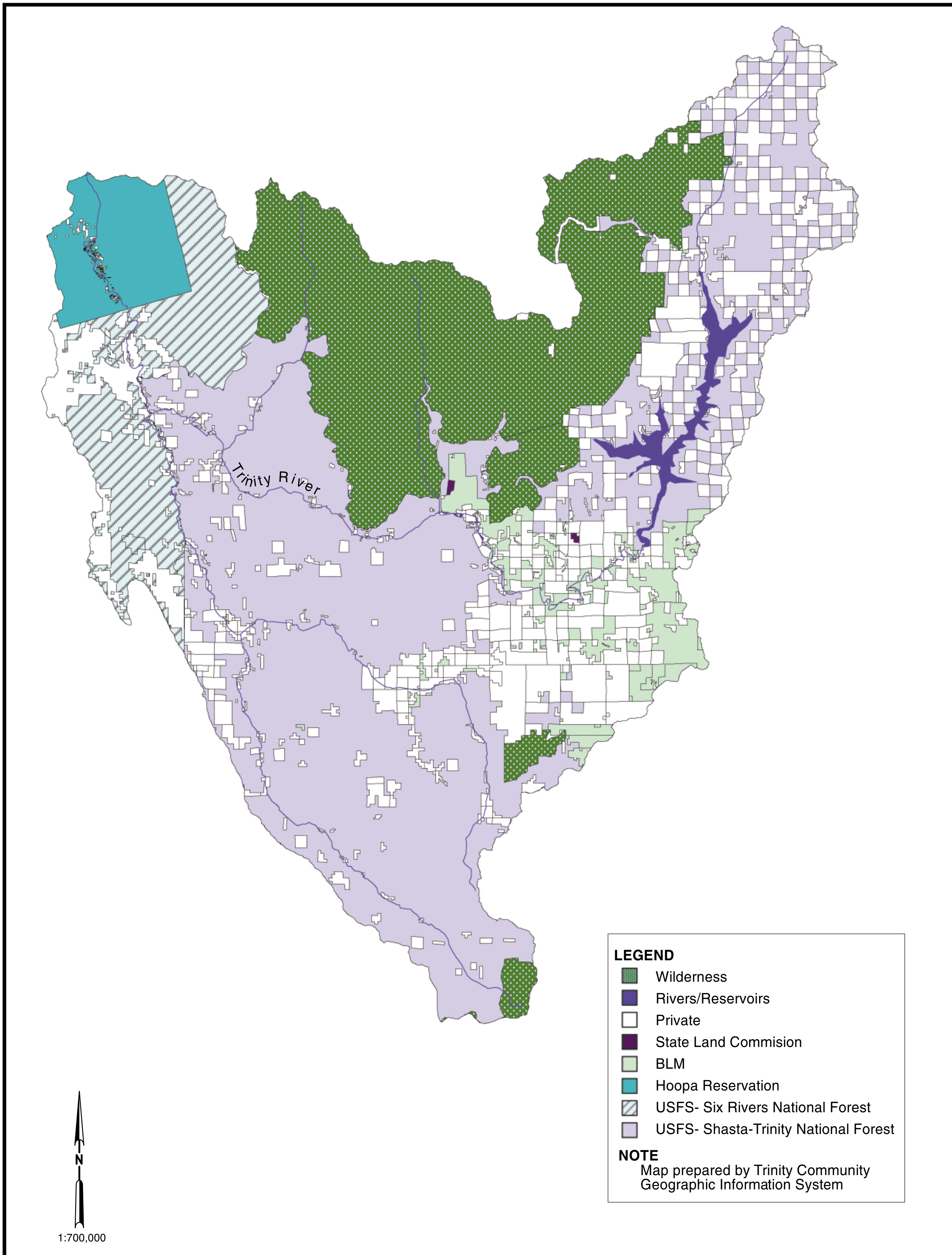

FIGURE 3-41
TRINITY RIVER BASIN LAND OWNERSHIP
TRINITY RIVER MAINSTEM FISHERY RESTORATION EIS/EIR

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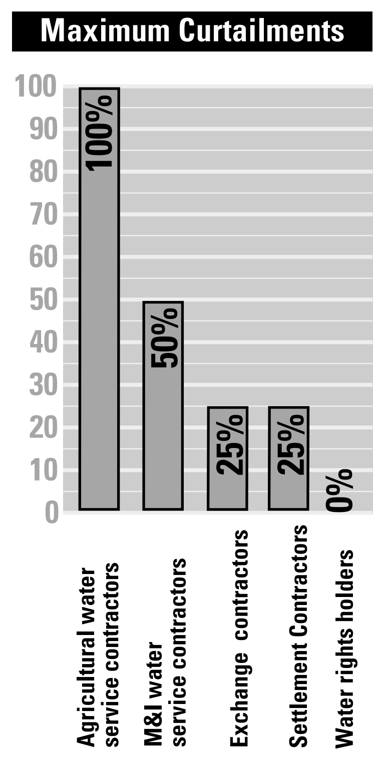
Lower Klamath River Basin / Coastal Area. The lower Klamath River flows entirely within the boundaries of the Yurok Indian Reservation. The reservation extends from the northern border of the Hoopa Reservation to the Pacific Ocean near Requa, and consists of about one-quarter of the lower Klamath River watershed. Population in the overall watershed is 1,900, the majority of which live in the lower river area in or near the towns of Klamath Glen, Klamath, and Requa, and along Highway 101. The primary commercial activities are tourism, forestry, and fishing. A gravel mine near the mouth of the Klamath River is the sole industrial operation. The predominant land use is forest management. Development of most of the land not situated near the river is constrained by Timber Production Zoning, county and tribal land use restrictions, topography, and public ownership. The annual value of (non-timber) commercial agricultural production in the lower Klamath River watershed is less than 1 percent of the totals for Humboldt and Del Norte Counties.

Central Valley / CVP Service Areas. California's population growth and corresponding changes in land use and economy have profoundly affected the Central Valley land and water resource base. Increased population has led to greater urban water demand and more urbanization of agricultural and other lands. Until recently, most urbanization in California occurred near the coastal cities. In the last decade there has been a shift in new development from the coast to the Central Valley and inland deserts. Approximately 36 percent of California's 1990 population of 29,760,000 lived in the Central Valley region.

California's population growth and corresponding changes in land use and economy have profoundly affected the Central Valley land and water resource base.

The CVP supplies M&I water to more than 40 entities under service, water rights, and exchange contracts (a discussion of water rights and contract requirements is presented in the Water Resources section [3.3]; contract types are also discussed in the Agriculture section [3.9.2]). CVP M&I water service contracts total approximately 500,000 af, water rights contracts total 410,000 af, and exchange contracts total 75,000 af. Limits on curtailments to deliveries in dry years are not specified for most service contracts (i.e., 100 percent curtailment can occur). Water rights and exchange contracts typically must be given priority over CVP M&I service contracts.



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The CVP provides M&I water service contracts to portions of the Central Valley, the San Francisco Bay region, and the Central Coast region. In the Central Valley most M&I service contract water use occurs near Redding and Sacramento and in some towns and cities in the San Joaquin Valley. The CCWD diverts CVP service contract water from the Delta for use in the east Bay Area, and the San Felipe Unit of the CVP diverts service contract water from the Central Valley to Bay Area users in Santa Clara and San Benito Counties. Unlike water rights holders and exchange

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contractors, M&I water service contractors are susceptible to curtailments. M&I service contractors with few alternative water supplies, such as the CCWD in the Bay Area region, the City of Roseville in the Sacramento Valley, and the City of Tracy in the San Joaquin Valley, are examples of entities most affected by CVP service contract reductions.

Most CVP M&I water service contractors experienced water delivery shortfalls during the drought of 1987-1992. During this period, mandatory water conservation was imposed by most contractors in an effort to reduce retail deliveries up to 20 percent or more in some areas. Water providers also acquired additional supplies to meet demands that remained even after conservation measures were put in place. Such water was acquired primarily through water transfers overseen by the Drought Water Bank operated by DWR. Over 500,000 af of water was transferred through this process to M&I buyers. In the future, drought conservation is expected to again be used as the first method in mitigating drought-induced water delivery shortfalls.

Use of CVP water by M&I service contractors varies considerably. Some users have used their full contract amounts in recent years; most are not expected to do so until sometime after the year 2000. In recent years, M&I exchange contract deliveries have ranged from 43,000-55,000 af. Use of CVP M&I service, water rights, and exchange contracts could exceed 800,000 af as early as 2010 (about 80 percent of all contracts).

Environmental Consequences.

Methodology. A DWR study was used to analyze potential flood damage associated with a range of releases from Lewiston Dam (California Department of Water Resources, 1997). The study site locations are shown on Figure 3-42. To calibrate the model used in the study, a constant flow of 5,000 cfs was released from Lewiston Reservoir for several days in May 1996. A release of 2,000 cfs was used as the existing conditions and No Action baselines. Further explanation of this baseline with regard to uncontrolled releases (i.e., spills) is presented under the No Action Alternative discussion. Flooding of a home in the Cooper's Bar area is based on observation of the New Year's 1997 flood and not the DWR study. The results of model runs are presented for the peak flows associated with each alternative in Table 3-40.

Parcels were considered to need purchase or improvement if the first floor of a structure would be inundated and/or access to the parcel would be flooded and it would be impractical to relocate or elevate the road.

Parcels were considered to need purchase or improvement (e.g., elevation of a road) if the first floor of a structure would be inundated and/or access to the parcel would be flooded and it would be impractical to relocate or elevate the road. Vacant parcels were considered to need purchase if buildable areas (outside the

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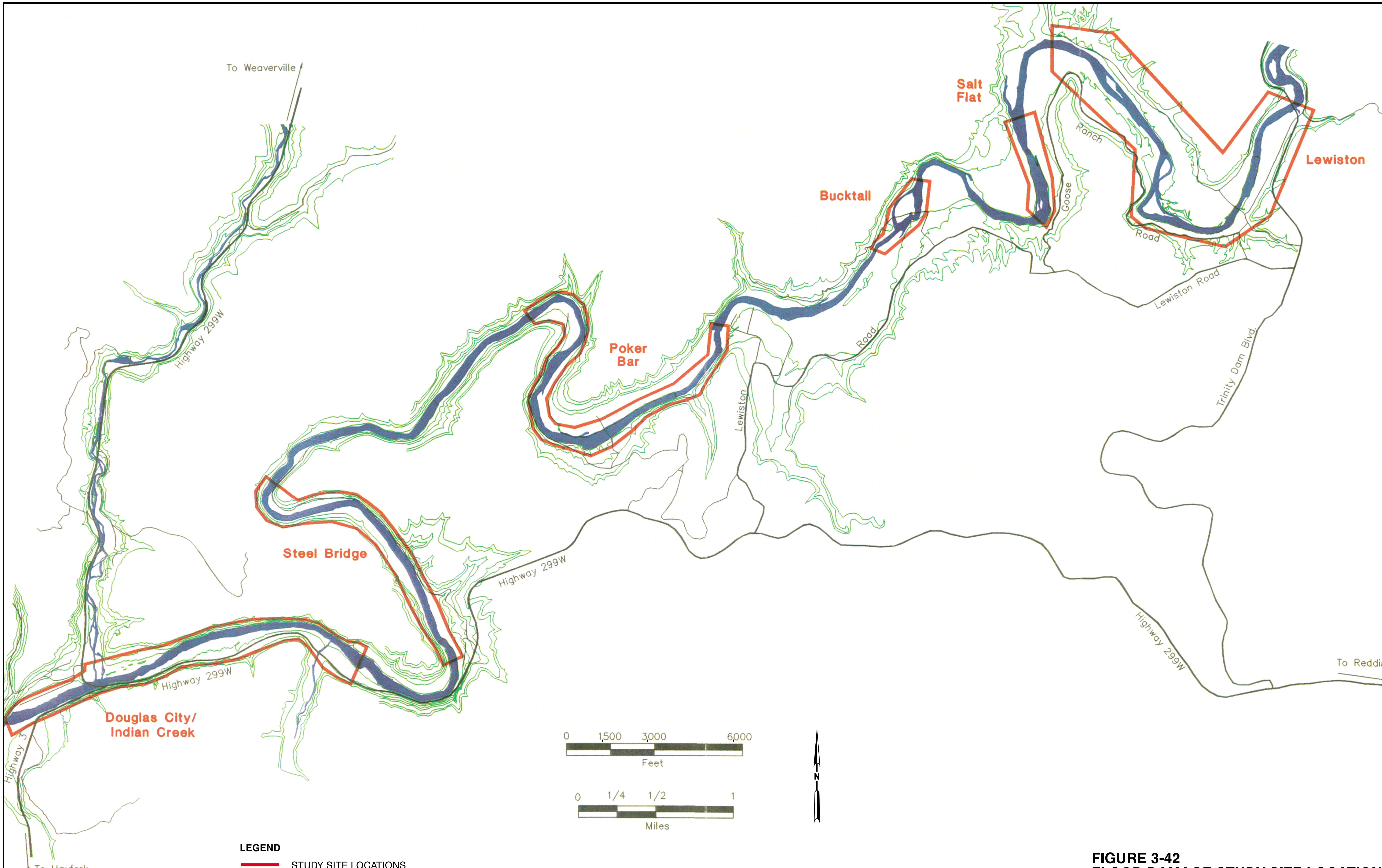

Source: Department of Water Resources, State of California

FIGURE 3-42
FLOOD DAMAGE STUDY SITE LOCATIONS
TRINITY RIVER MAINSTEM FISHERY RESTORATION EIS/EIR

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TABLE 3-40
Parcels and Bridges Inundated by Alternative and Site

	No Action Alternative/Existing Conditions	Change from No Action Levels: Maximum Flow	Flow Evaluation	Percent Inflow	State Permit
Trinity River Basin					
Impacts to Properties					
Bucktail	No impact	14 (8 developed/13 undeveloped)	No Impact	2 (developed)	No impact
Cooper's Bar	No impact	1 (developed)	No impact	1 (developed)	No impact
Douglas City/Indian Creek	No impact	10 (developed)	1 (developed)	5 (developed)	No impact
Lewiston	No impact	2 (developed)	No impact	No impact	No impact
Poker Bar	No impact	79 (40 developed/ 39 undeveloped)	No impact	8 (developed)	No impact
Steel Bridge	No impact	6 (undeveloped)	No impact	No impact	No impact
Salt Flat	No impact	No impact	No impact	No impact	No impact
Total Properties Inundated	**0 parcels**	**112 parcels** (61 developed/51 undeveloped)	**1 parcels** (developed)	**16 parcels** (developed)	**0 parcels**
Impacts to Bridges					
Bucktail Bridge (serves 57 parcels)	No impact	Bridge replacement required	Bridge replacement required	Bridge replacement required	No impact
Poker Bar Bridge (serves 77 parcels)	No impact	Bridge significantly impacted but no replacement required[a]	Bridge replacement required	Bridge replacement required	No impact
Salt Flat Bridge (serves 27 parcels)	No impact	Bridge replacement required	Bridge replacement required	Bridge replacement required	No impact
Treadwell Bridge (serves 8 parcels)	No impact	Bridge replacement required	Bridge replacement required	Bridge replacement required	No impact
Total Monetary Damages (million $)	**0**	**14.3**	**5**	**6**	**0**

[a]Poker Bar Bridge would be significantly impacted; however, it would not be replaced because the 77 parcels served would be purchased.

current 100-year floodplain) would be inundated. Bridges were considered to need replacement if the first chord of the bridge would be inundated and / or the bridge's abutments would be undermined by scour.

Flood impacts are not anticipated to occur in the Lower Klamath River Basin / Coastal Area given the lack of development and relatively minor impact that releases from Lewiston Dam have on Klamath River flows; therefore, impacts in this area are not discussed. M&I water use within the Trinity and Klamath River Basins is not served by the CVP and is not anticipated to be served in the future, and therefore, is not discussed. Flooding in the Central Valley as the result of TRD operations is not anticipated to occur, and therefore, is not discussed.

The analysis of M&I water deliveries and costs for the ***CVP service area***, including portions of the Bay Area, uses results from PROSIM and a spreadsheet model of water supply costs and economics. PROSIM is described in the Water Resources section (3.3). The M&I analysis uses average- and critical-period average water deliveries. The spreadsheet model includes both long-term and short-term analyses corresponding to average- and critical- period conditions, respectively. In the average condition, supply must meet demand, and water prices must recover costs. If a water delivery shortfall occurs, additional supplies are assumed to be developed, and prices are assumed to be increased to cover costs until total supply meets demand. Costs of replacement water supplies are based on conservation and reclamation costs from DWR's Bulletin 160-98.

Any new supplies acquired to eliminate shortfall in the average condition are assumed to be available to reduce shortage in the dry condition. Therefore, incremental costs in the dry condition are reduced by supplies acquired to meet demand in the average condition.

The dry period is characterized by fixed water prices, drought conservation customer shortage, and more expensive replacement supplies. If supplies are not adequate to meet demand during the dry period, drought conservation is assumed to be the first method used to decrease demand. Drought conservation results in customer shortage, which is defined as a situation in which customers are not allowed to use the amount of water they want. If drought conservation alone cannot eliminate the dry period shortfall, then it assumed that additional water supplies would be purchased. Total M&I dry condition costs are estimated as the costs of replacement supplies and customer shortage (which occurs when customers cannot obtain the quantity of water they demand), plus net revenue losses from reduced water sales. Customer shortage costs are the dollar amount

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customers would be willing to pay to eliminate the shortage above what they would have paid.

CVP M&I water rights and exchange contract deliveries are assumed to be unaffected by the alternatives (i.e., PROSIM, as discussed in the Water Resources section [3.3], assumes full deliveries to both types of users). Curtailments to M&I service contractors are no more than 50 percent in critically dry years. This assumption is made given that Reclamation has historically not cut M&I water service contractors more than 50 percent, and intends to maintain the same policy in the future.

Some contractors would experience higher-than-average per-capita costs because they have limited or more expensive alternative supplies.

Some contractors would experience higher-than-average per-capita costs because they have limited or more expensive alternative supplies (the Land Use Technical Appendix E further discusses cost impacts for more-than-average affected contractors in terms of cost per capita to better illustrate these impacts).

Traffic impacts were assessed based on the potential contribution of the alternatives to traffic congestion on local roadways. Traffic would be affected by alternatives that include spawning gravel placement, construction activities (i.e., Maximum Flow), mechanical channel modifications, or by flows that would affect the viability of bridges. A quantitative analysis would require information on the specific number of trips generated under each alternative and the specific sites (for collecting spawning gravel) that would be used for implementation of alternatives. Because specific information on sites is not currently available, this analysis is qualitative rather than quantitative. In addition, the potential for heavy truck traffic to damage local roadways was considered. It is not expected that any detectable, project-related traffic impacts would occur outside of the Trinity River Basin.

<u>Significance Criteria</u>. Impacts to residential and M&I land uses would be significant if they resulted in:

- Flooding and resultant damage to structures or improvements such as homes and bridges, or an increased likelihood of flooding such structures or improvements, or periodic flooding of entire vacant parcels that currently have buildable areas outside of the 100-year floodplain
- Conflict with any applicable land use plan, policy or regulation for an agency with jurisdiction over the project (including, but not limited to, the general plan, specific plan, local coastal program, or zoning ordinance) adopted for the purpose of avoiding or mitigating an environmental effect
- The preclusion of the continued residential or M&I use of an existing parcel

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- Cause an increase in traffic that is substantial in relation to the existing traffic load and capacity of the street system (i.e., result in substantial increase in either the number of vehicle trips, the volume to capacity ratio on roads, or congestion at intersections)
- Exceed, either individually or cumulatively, a level of service standard established by the county congestion / management agency for designated roads or highways
- Substantially increase hazards due to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)
- Result in inadequate emergency access
- Result in inadequate parking capacity
- Conflict with adopted policies, plans, or programs supporting alternative transportation (e.g., bus turnouts, bicycle racks)

Economic impacts were not evaluated for significance, but they were used to determine the significance of indirect physical changes. For example, M&I water supply economics were used to determine if M&I water decreases would induce significant land use changes. Accordingly, it was determined that water supply reductions, if large enough, could conflict with adopted regulatory policies (e.g., those found in adopted plans) intended to protect the environment or could preclude the continued municipal land use of a parcel per the following threshold:

- A 1 percent retail water price increase for a region in the average condition is considered substantial and suggests a potentially significant impact on adopted plans or continued residential use. These impacts would be significant only for those CVP M&I water service contractors within each region who have limited supply alternatives. An average 1 percent increase in the regional level indicates a larger increase for these CVP-dependent contractors.

<u>No Action</u>.

<u>Trinity River Basin</u>. Peak scheduled releases associated with the No Action Alternative would be 2,000 cfs in May. However, post-TRD releases have sometimes greatly exceeded this amount (including flows of approximately 14,500 cfs in 1974) as a result of large storm events combined with high reservoir storage. Such events could occur again under the No Action Alternative. However, for purposes of assessing flooding impacts it was determined that the scheduled peak release of 2,000 cfs should be used as the basis for comparison because this flow represents a planned condition and is conducive to

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analysis. At this release level, no residences or structures would be impacted. Traffic levels are expected to remain about the same as current conditions.

Central Valley/CVP Service Area. M&I water supplies in the year 2020 are assumed to be generally adequate in the average condition. Average retail price of water is assumed to be $205 and $133 per af in the affected portions of the Sacramento and San Joaquin Valley regions, respectively. Drought conservation and additional supplies would be needed during the dry condition. The Sacramento and San Joaquin Valley regions would need to conserve about 24,000 af and 12,000 af annually during dry conditions, and annual shortage costs would be $5.6 million and $1.7 million, respectively (Table 3-41 at the end of Section 3.9.1).

Regionwide, the Bay Area would have more than adequate supplies (an assumed excess of 8,800 af) due in part to a surplus in the South Bay subregion (14,600 af). However, the CCWD is assumed to need to acquire 5,800 af of new supplies to meet demand.

In the dry condition the Bay Area is assumed to use all available drought conservation (58,000 af), and would need to acquire additional supplies of 200,000 af to meet demand. Annual shortage and water costs for the Bay Area region during the dry condition are assumed to be $137-225 million annually.

Maximum Flow.

***Trinity River Basin*.** Scheduled peak releases associated with this alternative would be 15 times greater than No Action levels (from 2,000 to 30,000 cfs). The peak releases would occur for 5 days in the month of May in extremely wet years (assumed to occur 12 percent of the time). These flows would result in approximately 112 properties being flooded. Salt Flat Bridge, Bucktail Bridge, and Treadwell Bridge would need to be replaced in order to accommodate such peak events. The Poker Bar Bridge would not need to be replaced because the 77 parcels served by it are assumed to be purchased because of substantial flooding of the associated road system (6 feet or more) serving the parcels. The total monetary damages would be approximately $14.3 million (August 1999 estimate). Impacts to these 112 properties and the Salt Flat, Treadwell, Poker Bar, and Bucktail Bridges would be significant. Additional damage to some structures or improvements could also occur in areas that were not modeled, but are within the areas that would be inundated by the peak flow.

In wet years, and especially in extremely wet years, traffic levels would be noticeably greater under the Maximum Flow Alternative than under the No Action Alternative due to transport of up to 100,000 cubic feet (or more) of spawning gravel. However, a specific

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estimate of increased traffic levels is not possible at this time because the location of potential spawning gravel sources has not been identified. It is possible that the traffic associated with transportation of spawning gravel would be a constant effort, requiring stockpiling of spawning gravel in drier years for use in wetter years. Because of the potential for significant congestion, traffic safety, and road damage impacts in wet and extremely wet years, this impact remains potentially significant.

Additional traffic impacts may occur under the Maximum Flow Alternative due to the proposed modifications to Trinity Dam. A specific construction plan for Trinity Dam modification has not been selected, but the options currently being considered would require significant construction activity. Although the traffic impacts would be temporary, they would be potentially significant due to the high amount of traffic in the local area near Trinity Dam. Because specific construction information has not been developed, it is not possible to accurately assess potential traffic impacts. Accordingly, traffic impacts associated with Trinity Dam modifications remain potentially significant.

There are no mechanical channel modifications associated with this alternative. Damage to bridges that were not designed to withstand the high flows associated with the Maximum Flow Alternative could result in significant traffic impacts.

Central Valley/CVP Service Area. This alternative would result in the most adverse CVP water supply effect of any alternative. In the average condition, CVP contract supplies for M&I use would decrease 8-13 percent. Most of this reduction would be eliminated by acquiring other, more expensive supplies, such as groundwater. Increased water costs in the average condition would total $2.7-4.7 million annually for the Sacramento and San Joaquin Valleys combined. Retail water prices would increase by an average of 1.6 and 0.8 percent in the two regions, respectively. This would be a substantial economic effect that suggests a potentially significant adverse effect on municipal land use in the Sacramento Valley. In the dry condition, CVP deliveries to M&I service contractors would be reduced up to 22 percent (17.8/82) of No Action levels. Shortage costs in the Sacramento Valley region would increase 32 percent compared to No Action.

In the Bay Area region under the average condition CVP contract supplies for M&I use would decrease by 9 percent. Most of this reduction would be eliminated by acquiring other, more expensive supplies, such as reclaimed water. Annual costs of new water supplies in the average condition would be $6.5-10.7 million above No Action levels. These increases are greater than the Central Valley figures because the Bay Area uses more CVP M&I water, and the

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replacement water would be more expensive. Retail water prices would increase by 1.4 percent. This would be a substantial economic effect that suggests a potentially significant adverse effect on M&I land use. In the dry condition, Bay Area shortages would be more severe, resulting in an increase in water supply costs of $38-65 million annually. Shortage costs would increase 28 percent compared to No Action conditions. This large percentage increase is due in part to the small shortage cost assumed in the No Action condition. One of the most affected CVP M&I water service contractors likely would be the CCWD because (1) the CCWD is already short of supplies in the No Action condition, and (2) alternative supplies are relatively expensive. The annual increase in per capita water supply cost in the CCWD in the average and dry condition would be $20 and $120, respectively.

Flow Evaluation.

Trinity River Basin. Peak releases associated with this alternative would increase from 2,000 to 11,000 cfs in May in extremely wet years (assumed to occur 12 percent of the time). These flows would result in one developed property being flooded (one developed, four undeveloped) as well as necessitate the replacement of four bridges (Bucktail Bridge, Poker Bar Bridge, Salt Flat Bridge, and Treadwell Bridge). The total monetary damage to properties and bridges would be $5 million (1996 dollars). Impacts to this one property and the four bridges would be significant. Additional damage to some structures or improvements could also occur in areas that were not modeled, but are within the areas that would be inundated by this peak flow.

(Flow Evaluation) flows would result in one property being flooded as well as necessitate the replacement of four bridges.

In wet and extremely wet years, traffic levels would be noticeably greater than under the No Action Alternative due to transport of up to 49,100 cubic feet of spawning gravel. It is possible that the traffic associated with transportation of spawning gravel would be a constant effort, requiring stockpiling of spawning gravel in drier years for use in wetter years. However, a specific estimate of increased traffic levels is not possible at this time because the location of potential spawning gravel sources has not been identified. Because of the potential for significant congestion, traffic safety, and road damage impacts in wet and extremely wet years, this impact remains potentially significant. There are no physical modifications to TRD under this alternative.

Traffic levels would also increase due to the construction of 47 new mechanical restoration projects. However, construction of these projects would occur over several years, and construction activities would occur at separate project sites. Accordingly, the extent of traffic impacts caused by the construction of mechanical restoration projects would be less than significant.

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Damage to bridges that were not designed to withstand the high flows associated with the Flow Evaluation Alternative could result in significant traffic impacts.

Central Valley/CVP Service Area. In the average condition this alternative would have a small effect on M&I water supplies. Retail water prices would increase by an average of 0.4 and 0.1 percent in the Sacramento and San Joaquin Valley regions, respectively. In the dry condition, supplies would be reduced 2-15 percent. Additional shortage costs would amount to $3.5 million annually, primarily in the Sacramento Valley. Shortage costs would increase 62 percent compared to No Action. This large increase is due in part to the small shortage cost assumed in the No Action condition.

In the Bay Area water supplies would be little affected under the average condition. Water supplies would be reduced about 5,100 af (2 percent), and retail water price would increase 0.2 percent, which would be a less than significant impact. In the dry condition a CVP contract supply reduction of 10 percent (22.4/231) would cost $25-43 million annually in customer shortage costs, net revenues, and water costs as compared to No Action. Shortage costs would increase 18 percent compared to No Action. The annual increase in per capita water supply cost in the CCWD in the average and dry condition would be about $4 and $80, respectively.

Percent Inflow.

Trinity River Basin. Peak flows associated with this alternative would be around 11,000 cfs. This alternative would result in the same peak release at Lewiston as the Flow Evaluation Alternative, but the peaks are anticipated to occur during winter and early spring when tributary inflow from creeks such as Rush Creek, Grass Valley Creek, and Indian Creek would be much higher than during late May. These flows would result in approximately 16 developed properties being flooded, as well as necessitate the replacement of four bridges (Bucktail Bridge, Poker Bar Bridge, Salt Flat Bridge, and Treadwell Bridge). The total monetary damage would be $6 million (1996 dollars). Impacts to these 16 properties and the 4 bridges would be significant. Additional damage to some structures or improvements could also occur in areas that were not modeled but are within the areas that would be inundated by this peak flow.

Traffic levels under the Percent Inflow Alternative due to spawning gravel placement are expected to be about the same as under the No Action Alternative. Accordingly, no impact would occur. Traffic levels due to construction of 47 mechanical restoration projects are expected to be the same as under the Flow Evaluation Alternative. As described under the Flow Evaluation Alternative, construction of

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the mechanical restoration projects is expected to result in less-than-significant traffic impacts.

Damage to bridges that were not designed to withstand the high flows associated with this alternative could result in significant traffic impacts.

Central Valley/CVP Service Area. This alternative would have a very small effect on CVP M&I water supplies. Impacts range from a negligible cost in the average condition to a small benefit in the dry condition. Retail water price would increase by an average of 0.1 percent in the Sacramento Valley. There would be no measurable change in the San Joaquin Valley. In the dry condition, water shortage costs would be reduced 12 and 6 percent, respectively.

Bay Area impacts would be similar to those described for the Central Valley. In the average condition retail price would change by less than 0.1 percent, which would be a less than significant impact. In the dry condition shortage costs are reduced by 3 percent.

Mechanical Restoration.

No impacts to residential or M&I land use would occur as the flows and associated water exports are the same as No Action. Potential traffic impacts would be about the same as described under the Percent Inflow Alternative (i.e., less than significant).

State Permit.

Trinity River Basin. No flooding impacts would occur as a result of the scheduled peak flows (250 cfs in November of all years). However, uncontrolled spill events could occur at a slightly increased frequency compared to the No Action Alternative. The magnitude and frequency of such events is unknown.

Traffic levels under the State Permit Alternative are expected to be about the same as under the No Action Alternative. Accordingly, no traffic impacts would occur.

Central Valley/CVP Service Area. In comparison to No Action, more water would be available for M&I use. CVP contract water deliveries would increase slightly in the average condition. Central Valley municipal water suppliers would save $0.6-0.8 million annually in water supply costs. Retail water prices would decline by an average of 0.3 and 0.1 percent in the Sacramento and San Joaquin Valley regions, respectively. In the dry condition, additional water supplies would reduce shortage costs by $1.7 and $0.3 million, respectively, or about 30 and 18 percent.

In the Bay Area water supply cost savings would be around $0.7-1.1 million during the average condition. Retail water price

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would be reduced by 0.1 percent. In the dry condition, purchases of drought supplies would be reduced, saving $17-30 million annually in water and shortage costs. These savings are about 12 percent of No Action levels.

Existing Conditions versus Preferred Alternative.

Trinity River Basin. The increment of flood-related and traffic impact between the existing conditions baseline (i.e., 1995) and the Preferred Alternative (in the year 2020) would be identical to that discussed under the Flow Evaluation (due to the existing conditions and No Action baselines being identical).

Central Valley. Table 3-42 at the end of Section 3.9.1 compares the Preferred Alternative in 2020 to existing conditions (i.e., 1995). Population across all regions in the year 2020 is assumed to be approximately double that of the existing conditions population, resulting in an increase in demand. As described in Section 2.1.2, CVP supplies for M&I use are assumed to increase to meet this demand.

Retail water price would increase by an average of 8 and 4 percent in real dollars (i.e., no inflation is assumed) in the Sacramento and San Joaquin Valleys, respectively. The majority of these increases (more than 7 of the 8 percent identified for the Sacramento Valley, and essentially all of the 4 percent identified for the San Joaquin Valley) is attributable to retail water price increases assumed as part of the No Action condition, and not due to implementation of the Preferred Alternative. In the dry condition, shortage costs would increase 12 percent in the Sacramento Valley and 70 percent in the San Joaquin Valley. The majority of these increases (more than 7 of the 12 percent identified for the Sacramento Valley, and essentially all of the 70 percent identified for the San Joaquin Valley) are attributable to shortage cost increases assumed as part of the No Action condition, and not due to implementation of the Preferred Alternative.

Retail water price in the Bay Area would increase by an average of 17 percent. Practically all of this increase is attributable to retail water price increases assumed as part of the No Action condition. In the dry condition, shortage costs would increase 129 percent. The majority of these increases (approximately 93 of the 129 percent) are attributable to shortage cost increases assumed as part of the No Action condition, and not due to implementation of the Preferred Alternative. This proportionately large increase in shortage cost is due to an assumed large increase in demand without a commensurate increase in supplies.

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Mitigation. The following mitigation could reduce the significant flooding impacts identified under the Maximum Flow, Flow Evaluation, and Percent Inflow Alternatives within the Trinity River Basin to a less than significant level:

- Property owners could be compensated at fair market value for all flood-related structure/improvement losses incurred, or funding would be provided to retrofit structures/improvements (e.g., bridges) to withstand peak flows (e.g., bridges) associated with the selected alternative.
- Property owners who have parcels with buildable sites outside of the current 100-year floodplain that would be regularly inundated by an alternative could be compensated at fair market value for the loss of development rights to that parcel.

Given the funding for this mitigation is not available at this time, flood-related impacts are considered significant and unavoidable.

The following mitigation would reduce the significant traffic impacts identified under the Maximum Flow, Flow Evaluation, and Percent Inflow Alternatives within the Trinity River Basin to a less than significant level:

- Prior to initiating construction activities or spawning gravel collection, conduct a site-specific environmental review that considers impacts to traffic patterns and the structural integrity of roadways.
- Prepare environmental documentation, as necessary, prior to replacing or modifying bridges vulnerable to high flows required under the alternatives. Impacts to traffic patterns and access to emergency services should be minimized.

Potentially significant land use (M&I)-related impacts could occur as a result of decreased surface-water supplies associated with the Maximum Flow Alternative. 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. 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

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TABLE 3-41
Summary of Municipal Water Supply Economics[a]

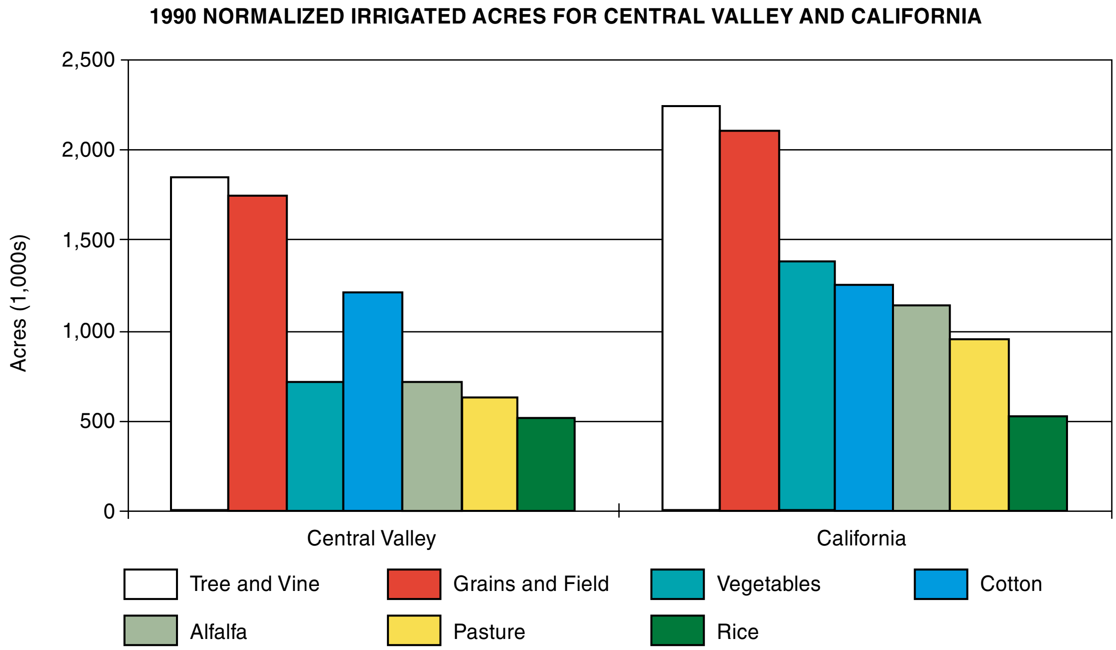
				Change from No Action Levels											
	No Action			Maximum Flow			Flow Evaluation			Percent Inflow			State Permit		
Average Condition	**Sac.[b] Valley**	**Bay Area**	**San Joaquin Valley**	**Sac. Valley**	**Bay Area**	**San Joaquin Valley**	**Sac. Valley**	**Bay Area**	**San Joaquin Valley**	**Sac-ramento Valley**	**Bay Area**	**San Joaquin Valley**	**Sac. Valley**	**Bay Area**	**San Joaquin Valley**
Result															
CVP Contract Delivery (taf/yr)	106	279	27	-13.3	-24.8	-2.2	-3.5	-5.1	-0.4	-0.6	-0.3	-0.1	2.4	5.1	0.5
Shortfall (taf/yr)	3.3	-8.8	0.4	13.3	24.8	2.2	3.5	5.1	0.4	0.6	0.3	0.1	-2.4	-5.1	-0.5
Retail Price ($/af)	205	539	133	207	547	134	206	540	133	205	539	133	205	539	133
Retail Price (percent increase from No Action)	0	0	0	1.6	1.4	0.8	0.4	0.2	0.1	0.1	0.0	0.0	-0.3	-0.1	-0.0
New Supply Cost, (million $/yr)	0.5 to 0.9	1.2 to 2.0	0.1	2.3 to 3.9	6.5 to10.7	0.4 to 0.8	0.6 to 1.0	1.1 to 1.9	0.1	0.1	0.0	0.0	-0.5 to -0.7	-0.7 to -1.0	-0.1
Dry Condition (1928-1934 average hydrology)															
CVP Contract Delivery, (taf/yr)	82	231	21	-17.8	-35.6	-1.2	-12.2	-22.4	-0.4	1.5	4.7	0.4	7.9	20.7	2.1
Shortage (taf/yr)	24	257	12	5	21	-1	9	19	0	-2	-5	0	-5	-18	-2
Shortage Cost (million $/yr)															
Drought Supplies[c]	0.0	132 to 220	0.0	0.0	40 to 67	0.0	0.0	27 to 45	0.0	0.0	-5 to -8	0.0	0.0	-19 to -32	0.0
Surplus and Net Revenue Losses[d]	5.6	5.0	1.7	1.8	-2.4	-0.2	3.5	-2.1	0.0	-0.7	1.0	-0.1	-1.7	2.4	-0.3
Total Shortage Cost/Yr (million $)	5.6	137 to 225	1.7	1.8	38 to 65	-0.2	3.5	25 to 43	0.0	-0.7	-4 to -8	-0.1	-1.7	-17 to -30	-0.3
Shortage Cost (percent increase from No Action)	0	0	0	32	28	-12	62	18	0	-12	-3	-6	-30	-12	-18

[a] Comparison of Preferred Alternative to existing conditions is shown in Table 3-42. Each region only includes a portion of the region potentially affected.

[b] Sac. Valley = Sacramento Valley

[c] A range of plus or minus 25 percent is used to reflect uncertainty in the costs of alternative supplies.

[d] Includes net revenue losses, surplus losses, and water supply cost savings.



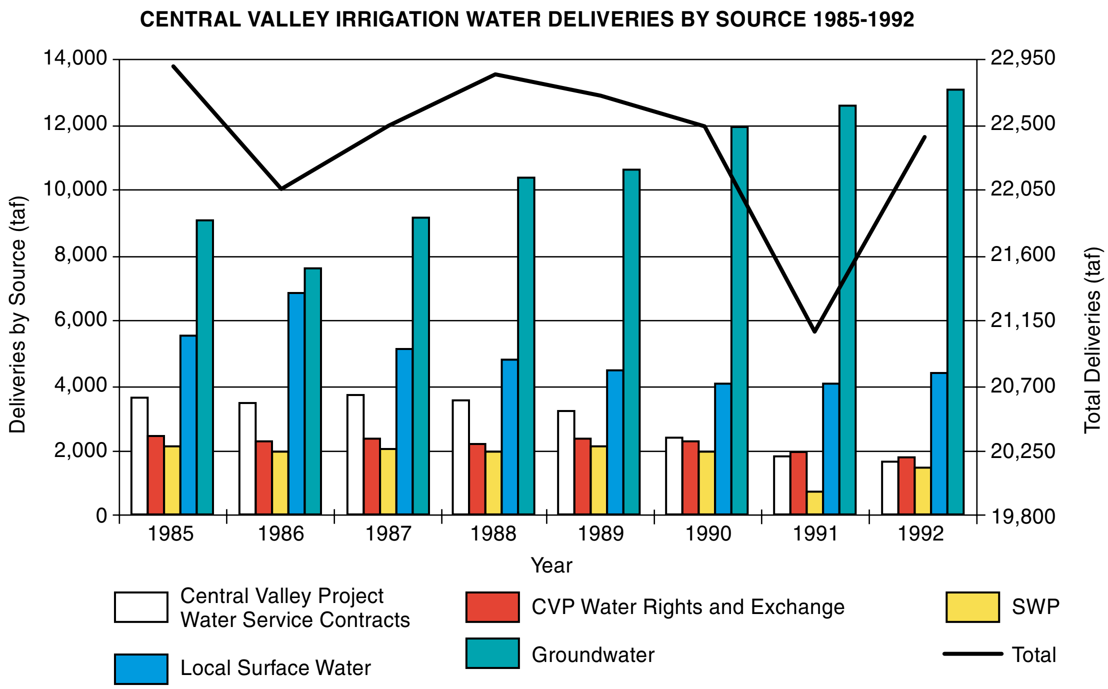


FIGURE 3-43
1990 NORMALIZED IRRIGATED ACRES AND CENTRAL VALLEY IRRIGATION WATER DELIVERIES BY SOURCE FROM 1985-1992
TRINITY RIVER MAINSTEM FISHERY RESTORATION EIS/EIR

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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.

TABLE 3-42
Comparison of Preferred Alternative and Existing Conditions Alternative Results

	Existing Conditions (1995)			Preferred Alternative (2020)		
Average Condition	**Sac. Valley**	**Bay Area**	**San Joaquin Valley**	**Sac.[a] Valley**	**Bay Area**	**San Joaquin Valley**
Result						
CVP Contract Delivery (taf/yr)	80	257	24	102.5	274	27
Shortfall (taf/yr)	0	[b]	0	6.8	-3.7	0.8
Retail Price ($/af)	190	450	126	206	540	133
New Supply Cost (million $/yr)	0	0	0	1.1 to 1.9	2.3 to 3.9	0.2
Dry Condition						
CVP Contract Delivery (taf/yr)	64	226	18	70	209	21
Shortage (taf/yr)	21	86	1	33	276	12
Shortage Cost (million $/yr)						
Drought Supplies	3.0	0	1.4	0.0	159 to 265	0.0
Surplus and Net Revenue Losses	5.1	94	-0.4	9.1	3.0	1.7
Total Shortage Cost/yr (million $)	8.1	94	1.0	9.1	162 to 268	1.7

[a] Sac. Valley = Sacramento Valley

[b] The Bay Area has excess supply in the average condition, but the amount has not been determined.

3.9.2 Agriculture

Affected Environment.

Trinity River Basin. Agriculture is not a major activity in the Trinity River Basin because of the rugged terrain and lack of suitable agricultural lands. In Trinity County, only 5.7 percent of the land is farm-

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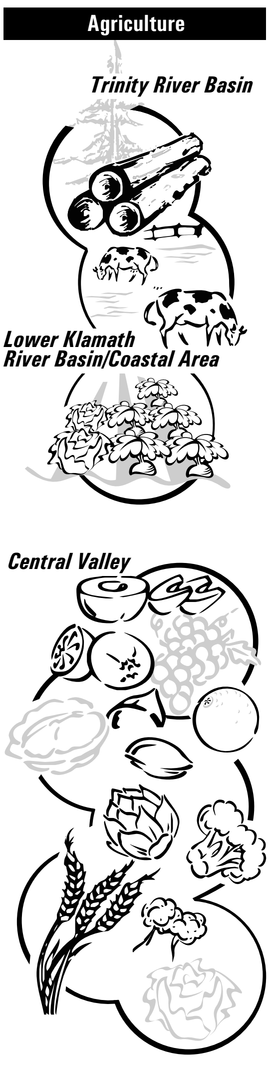
land, due mostly to the lack of suitable land and / or zoning. In contrast, 26.9 percent of neighboring Humboldt County is farmland (mostly along the coast). The largest sector of the agricultural economy in the Trinity River Basin is cattle ranching and grazing. The area that Trinity Reservoir now occupies was once prime ranch land. Currently, small tracts of land classified as prime agricultural land are located in the Hayfork, Hyampon Valley, Willow Creek, and Hoopa areas. Of the 25 percent of the Trinity River Basin that is privately owned, the majority is used for timber production.

Almost 80 percent of the irrigated land in California is located in the Central Valley.

<ins>Lower Klamath River Basin / Coastal Area</ins>. Agricultural land in the area is limited. Roughly 200 acres are cultivated for livestock forage, fruit trees, and row crops on relatively small tracts near the river, and some cattle grazing occurs higher in the watershed. The annual value of non-timber commercial agricultural production in the lower Klamath watershed is less than 1 percent of the totals for Humboldt and Del Norte Counties.



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<ins>Central Valley</ins>. The Central Valley is an important agricultural region for both the state and the country. In 1993, the 19 Central Valley counties contributed more than 60 percent, by value, of California's agricultural production and included 6 of the top 10 agricultural counties in the state. The Central Valley produces almost 10 percent of the total U.S. market value of crop production, including 40 percent of the nation's fruits and nuts, 20 percent of the cotton, and 15 percent of the vegetables. California producers account for about 10 percent of total U.S. agricultural exports. These exports represent almost 25 percent of the gross farm income of the state. Many of California's leading export commodities are largely or exclusively grown in the Central Valley, including cotton, rice, almonds, grapes, oranges, walnuts, prunes, tomatoes, and wheat.

Almost 80 percent of the irrigated land in California is located in the Central Valley. Water deliveries for agriculture average about 22.5 maf per year, with CVP providing about 25 percent, the SWP about 10 percent, local surface-water rights about 30 percent, and groundwater about 35 percent (Figure 3-43).

Most districts that receive CVP supplies also use other supplies such as groundwater. Use of such sources varies on an annual basis because of changes in weather and crop market conditions.

The CVP normally supplies irrigation water to approximately 200 water districts, individuals, and companies through water service, water rights, and exchange contracts (Figure 3-43). The type of contract a particular district holds determines the potential CVP water supply curtailments in dry years. Those districts with water service contracts are subject to the greatest curtailments (as much as 100 percent), while districts with water rights settlement contracts,

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such as those along the Sacramento River, are cut no more than 25 percent. Districts / entities with pre-1914 water rights that do not have settlement contracts with Reclamation are entitled to their full right regardless of CVP operations (see the Water Resources [3.3] section).

In recent years CVP water has been delivered to about 13,000 full-time and 6,300 part-time farms, or just less than 50 percent of all Central Valley farms. (See Table 3-43 for crop mix, value per acre, and total value of crops produced on land receiving CVP water.) The federal farm program has been especially important to individual farmers in the Central Valley, especially for rice and cotton production, as a substantial share of the revenue from these crops was derived directly or indirectly from program. From 1985-1995, as many as 400,000 acres of California rice and cotton land was idled by acreage reduction requirements (set-asides). Additional fallowing was allowed during the worst drought years, without loss of most government payments. The 1996 Farm Bill resulted in a major revision to the programs for most crops, including rice and cotton. Acreage reduction programs have been eliminated, and government payments per unit of crop produced have been replaced with declining, lump-sum payments.

In recent years CVP water has been delivered to about 13,000 full-time and 6,300 part-time farms, or just less than 50 percent of all Central Valley farms.

For analytical purposes, the Central Valley was divided into three subregions: the Sacramento Valley, the San Joaquin Valley, and the Tulare Basin (Table 3-44 and Figure 3-44). In addition, the San Francisco Region / San Felipe Unit, located west of the Central Valley, is also assessed as part of the Central Valley, as CVP supplies are used in this area.

TABLE 3-43
Crop Mix, Value per Acre, and Total Value of Crops Produced on Land Receiving CVP Water (1988)

Crops	Acres[a]	$ Value per Acre[b]	Million $ Value of Production
Cereals	383,053	414.40	158.7
Forage	225,583	511.29	115.3
Miscellaneous field crops	689,743	954.95	658.7
Vegetables	283,504	2,321.93	658.7
Seeds	46,984	717.99	33.7
Fruits	407,257	3,320.35	1,352.2
Nuts	148,417	1,706.40	253.3
Family garden and nurseries	7,448	14,927.50	111.2
Total	**2,191,989**	**1,524.38**	**3,341.4**

[a] Total acreage includes about 70,000 multiple-cropped acres.
[b] Average gross value per acre.
Sources: U.S. Bureau of Reclamation, 1988.

Sacramento Valley. Agriculture is the largest industry in the Sacramento Valley. The region produces a wide variety of crops including rice, grain, tomatoes, field crops, fruits, and nuts. The

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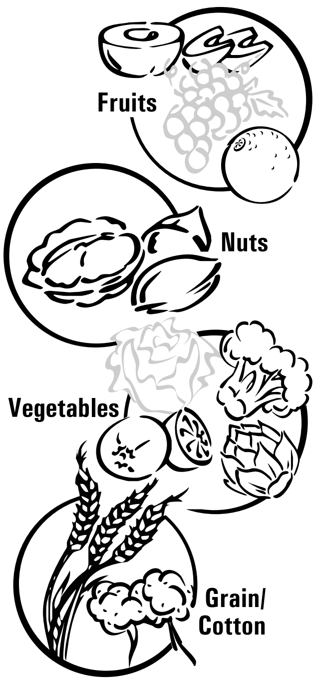
value of Sacramento Valley crop production reached $1.7 billion in 1992, with rice, tomatoes, and orchard crops providing the highest revenues. The CVP's Tehama-Colusa service area is representative of areas within the region that are heavily dependent on CVP supplies. Districts within the Tehama-Colusa service area (the Tehama-Colusa Canal Authority serves 15 member districts) hold water service contracts with Reclamation, making them subject to water delivery curtailments up to 100 percent in dry years. There are a total of 25 such districts within the Sacramento Valley region. Approximately 10 percent of the ***applied water*** within the region is provided through CVP service contracts.

TABLE 3-44
Central Valley Agricultural Land Use, Water Use, and Revenue

	Sacramento Valley	San Joaquin Valley	Tulare Basin	Total
Land Use, Average 1987-1990				
Irrigated Land (1,000 acres) [a]	2,013	2,695	2,041	6,749
Water Use [a], Average 1987-1990				
Total Applied Water (1,000 af)	6,907.8	8,271.5	6,116.9	21,296.1
CVP Water Service Contract Delivery (1,000 af)[b]	658.8	1,841.9	713.6	3,215.2
Total ETAW (1,000 af) [c]	4,492.6	5,918.9	4,523.4	14,934.9
Total Surface Water (1,000 af)	4,697.9	5,071.4	2,364.4	12,133.5
Revenue ($ millions) [d]				
Product Sales	1,569	5,144	3,306	10,019
Total Income [e]	1,759	5,317	3,443	10,519
Net Return ($ millions)[f]	486	1,146	737	2,369

[a]Estimated for CVPIA DPEIS (U.S. Bureau of Reclamation, 1997)
[b]Does not include water rights settlement and exchange deliveries
[c] ETAW = ***Evapotranspiration of applied water***
[d] 1992 estimates, United States Bureau of Census, 1994
[e] Includes government payments and California Conservation Corps (CCC) loans and direct sales and other private use
[f] Total income minus production expenses

Central Valley Agriculture



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San Joaquin Valley. The San Joaquin Valley region is the leading California area for production of grapes, almonds, walnuts, tomatoes, melons, and many other crops. Vegetables and cotton tend to be grown on the west side; grapes, fruits, nuts, and cotton are grown on the east. The value of crop production in 1992 was $5.3 billion. Most of this region west of the San Joaquin River depends on CVP water exported from the Delta. WWD has a CVP water service contract for over 1 maf and is representative of areas within the region that are dependent on CVP water. The district is subject to curtailments of up to 100 percent in dry years. There are 29 such districts within the region, of these, 25 receive water delivered through Delta export facilities. Over 20 percent of the applied water within the region is provided through CVP supplies (with WWD being the largest contractor). During the drought years of 1990

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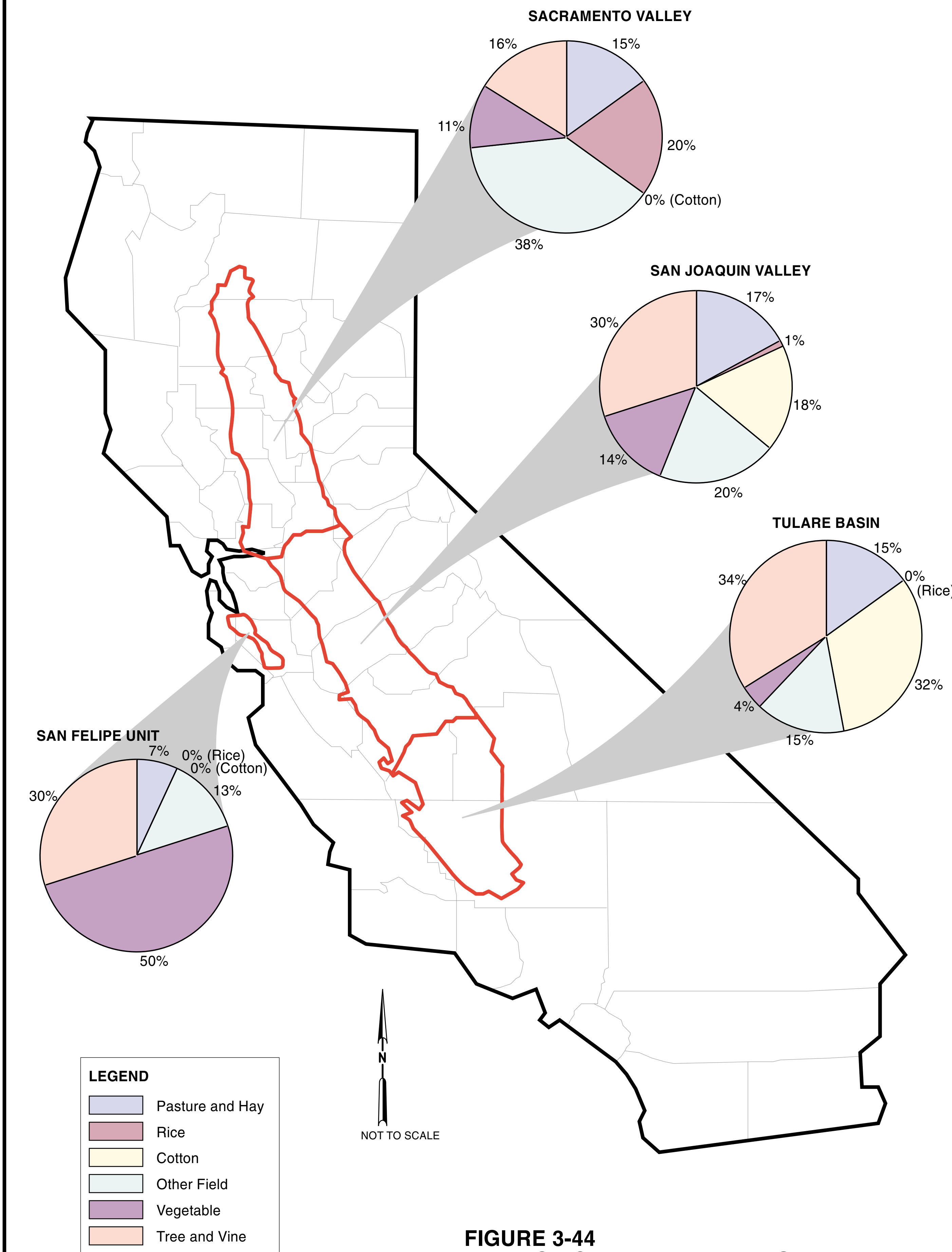

FIGURE 3-44
1990 AGRICULTURAL LAND USE IN THE CENTRAL VALLEY AND SAN FELIPE DIVISION
TRINITY RIVER MAINSTREAM FISHERY RESTORATION EIS/EIR

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through 1992, shortages in CVP water resulted in greater overdraft of groundwater and some land fallowing.

Tulare Basin. Irrigated agriculture accounts for more than 2 million acres of private land in the Tulare Basin region. Other agricultural lands and areas with native vegetation cover an additional 1.4 million acres. The principal crops grown in the region are cotton, grapes, and deciduous fruits. Substantial acreages of almonds and pistachios are also grown, as well as increasing acreages of truck crops, such as tomatoes. Fruits and nuts account for 34 percent of the total irrigated land in the region, with other important irrigated crops being cotton, hay and pasture, and vegetables. On the east side of the region, hay and pasture are also grown to support dairy production (Tulare County is the leading milk-producing county in the U.S.). The Tulare Basin counties produced $3.4 billion in crop revenue in 1992. Grapes had the highest ***value of production***, followed by cotton and citrus. Over 10 percent of the applied water within the region is provided through CVP water service contracts. There are 28 districts in the region that hold water service contracts with Reclamation, nine of which hold Cross Valley Canal exchange contracts that rely on water delivered through Delta export facilities.

Within much of the San Felipe service area CVP water and groundwater are the sole sources of irrigation water.

San Francisco Bay Region / San Felipe Unit. The San Felipe Unit of the CVP delivers irrigation water to parts of San Benito and Santa Clara Counties and is the only CVP unit outside of the Central Valley. San Felipe Unit's main agricultural crops are vegetables, orchards, and vineyards. Vegetables account for about 50 percent of the irrigated land in the San Felipe Unit. Total value of production in 1990 was $65 million. Irrigated land in San Benito and Santa Clara Counties is supplied by CVP water, SWP water (through the South Bay Aqueduct), other local surface supplies, and groundwater. Within much of the San Felipe service area CVP water and groundwater are the sole sources of irrigation water. In 1992, about 100,000 acres of irrigated land were harvested in the two counties. Of that, about 25 percent, or 25,000 acres, was served by CVP water.

The model considers groundwater pumping, land fallowing, crop changes, and irrigation efficiency changes; it estimates the least costly combination of these to adjust to changes in CVP water delivery.

Environmental Consequences.

Methodology. The Central Valley Production Model (CVPM) was used to assess potential changes in irrigated land use, gross revenue for irrigated lands, net revenue, and water use. The model was developed by DWR and updated and enhanced to analyze impacts resulting from changes to CVP and TRD operations. The model considers groundwater pumping, land fallowing, crop changes, and irrigation efficiency changes; it estimates the least costly combination of these to adjust to changes in CVP water delivery. A more detailed description of the model and assumptions is presented in the Land Use Technical Appendix E, as well as in the CVPIA Draft PEIS and associated appendices (U.S. Bureau of Reclamation, 1997). Runs

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were conducted for a simulated dry period (1928-1934), as well as for the average 1922-1990 water supply. Additional impacts including land values, farm financing, and risk are also noted. All results are presented in 1997 dollars.

Results for areas receiving CVP irrigation water are summarized for the four aggregated regions: Sacramento Valley, San Joaquin Valley, Tulare Basin, and the San Felipe Unit. In addition, two subregions dominated by agricultural water service contractors are assessed to better describe potential impacts in areas most likely affected by changes in water supply (due to the nature of the contracts). The subregions are the Tehama-Colusa subregion (an example of a subregion north of the Delta) and the Westlands subregion (an example of a subregion south of the Delta). Because agricultural uses within the Trinity and Klamath River Basins would not be substantially impacted by any of the alternatives, and agricultural use within both basins is limited, impacts within these two areas are not discussed.

Significance Criteria. Impacts on agriculture land uses would be significant if they:

- Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use or permanently impair the agricultural productivity of prime agricultural land. For purposes of this assessment, land is considered converted or impaired if it has permanently lost some or all of its agronomic capability to produce a crop. Agricultural land that is idled or fallowed due to lack of water supply is not considered permanently converted or impaired.
- Result in an aggregate increase in idling of more than 5 percent of the irrigated land within a region or most-affected subregion. (Subregions used for analysis are defined as the Tehama-Colusa and Westlands subregions.) The 5 percent level is judged to be sufficient to increase development pressure. Also, small percent changes may be results of imprecision within the modeling analysis.
- Involve other changes in the existing environment thatm due to their location or nature, could result in permanent conversion of Farmland to non-agricultural use.

No specific significance criteria are applied to changes in revenues or costs. These changes could potentially lead to social impacts caused by changes in regional income and employment. These impacts are discussed in the Socioeconomics section (3.11).

No Action.

Central Valley. Dominant crops in the Sacramento Valley in 2020 are expected to be rice, deciduous orchards, grains, and other field crops. The San Joaquin Valley would include a broad mix of crops, with cotton, deciduous orchards, and grapes having the largest acreage. The largest acreages in the Tulare Basin are anticipated to include cotton, deciduous orchards, and grapes. Alfalfa hay and grains would remain important crops in all three regions. Water use for irrigated agriculture is estimated to be 11.7 maf of surface water and 9.3 maf of groundwater. Surface-water application would decline in dry conditions, but groundwater pumping would increase. Total application increases in dry conditions because less rainfall is available for crops; the opposite happens in wet conditions.

Dominant crops in the San Felipe Unit would be vegetables and orchards. In general, crop mix is similar to that described in Affected Environment, except that some field crop acreage may shift to vegetables and orchards as demands for these crops are assumed to grow over time, due in part to assumed population growth. CVP irrigation water delivery is estimated to be about 68,000 af on average.

Maximum Flow.

Central Valley. This alternative results in the greatest reduction in CVP irrigation delivery to the Central Valley (Table 3-45 [at end of Section 3.9.2]). CVP water service contractors would be most affected because of CVP shortage allocation rules and existing CVP contracts. In the Sacramento Valley, the Tehama-Colusa service area is an example of a CVP service area dominated by water service contractor that would be affected. In the San Joaquin Valley, water service contractors in the Delta-Mendota and San Luis Canal service areas, such as WWD, would be affected.

Impacts of reduced CVP irrigation delivery can be summarized as follows:

- CVP water users would make three kinds of adjustments to reductions in CVP water supply: increased pumping of groundwater, land fallowing, and reduced water application rates. All of these adjustments are costly, either by increasing production cost or reducing revenue.
- In the Central Valley, groundwater pumping generally accounts for the largest part of the adjustment. Reductions in CVP irrigation water supply can be expected to increase the overdraft of groundwater, especially in the west side of the San Joaquin Valley.

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- Field crops (e.g., cotton, rice, hay and pasture) and grains are the crops likely to be fallowed due to water supply reductions. Vegetables, orchards, and vineyards are expected to show minor changes in acreage because of their relatively higher value.

Average deliveries would decline by 366,000 af on average, and by 265,000 af in dry conditions, compared to the No Action Alternative. Most of this decline would be replaced with pumped groundwater. Little land fallowing would occur. Almost two-thirds of the reduction would be borne by CVP contractors on the west side of the San Joaquin Valley. Results for WWD illustrate the level of impact. This area is already experiencing groundwater overdraft, and the estimated 120,000 af/yr of additional pumping induced by the alternative would result in additional impacts (see the Groundwater section [3.3.2] for additional discussion). Some additional groundwater pumping would also occur in the Tehama-Colusa service area, although many lands within this area have access to usable groundwater. Total reduction in value of production across the Central Valley regions is estimated to be $15.4 million per year.

Reduced CVP delivery in the San Felipe Unit would result in a larger proportion of land fallowing than in the Central Valley because of local groundwater ordinances' restrictions on groundwater use.

Reduced CVP delivery in the San Felipe Unit would result in a larger proportion of land fallowing than in the Central Valley because of local groundwater ordinances' restrictions on groundwater use. Land fallowing impacts would be significant, averaging over 30 percent of the crop lands served by the CVP. However, large acreages supplied by groundwater and other non-CVP supplies would continue to be irrigated. The change in acreage represents a 7.5 percent reduction when compared to all harvested acres in San Benito and Santa Clara Counties. Gross revenue on lands supplied by CVP water would fall by over 30 percent (about $30 million on average), and although this amount of acreage is relatively small on a statewide basis, the impact would be significant within the unit.

Other Impacts. Besides the direct impact on agricultural income, other impacts include:

- Decreased production of farm goods and increased prices would result in a loss to consumers because more of their income would be spent on the goods, and they may purchase less than they would under the No Action condition.

- Value of irrigated land primarily depends on the quantity and dependability of the water supply available and the profitability of farming. Reductions in CVP water deliveries and the associated net farm revenue are expected to reduce land value, particularly in the more affected areas such as the WWD and the Tehama-Colusa service area.

- Variable surface-water supplies can be a substantial economic problem in irrigated agriculture. Farmers often must make important investment, planting, and marketing decisions before knowing their water supply.
- Availability of farm credit depends largely on the expected profitability of production, the risk or variability of profit, and the collateral available to secure the lender's money. Therefore, changes in conditions that reduce profit, increase risk, or reduce the value of land can be expected to reduce lenders' willingness to lend money or to increase the interest rate they charge.

Flow Evaluation.

Central Valley. Losses of irrigated acreage would be less than 0.1 percent in each of the Central Valley regions (Table 3-45). Reduction in value of production across the Central Valley regions (Sacramento Valley, San Joaquin Valley, and Tulare Basin) is estimated to be $3.1 million annually. Of the total 83,000 af reduction of CVP water, 56,000 af would be replaced by new groundwater pumping, and the remainder is estimated to come from land fallowing and reduced irrigation losses. Most of the CVP water reduction would occur in the WWD in the San Joaquin Valley and in the Tehama-Colusa service area in the Sacramento Valley. Impacts during a dry year would be smaller than under the No Action Alternative due to the effect of increased irrigation efficiency as described under the Maximum Flow Alternative.

The San Felipe Unit is estimated to lose about 3,000 af of CVP supply in the average condition. The area would experience a decrease in CVP-supplied acreage of about 6 percent, which would be a significant impact. This represents a 1.5 percent reduction compared to all harvested acreage in the two affected counties. Value of production is estimated to decline by a similar percent.

Percent Inflow.

Central Valley. Impacts under the Percent Inflow Alternative would be minimal for all three Central Valley regions (Table 3-45). Decreases in irrigated acreage were estimated to be zero or less than 0.1 percent in each of the regions. The decrease in value of crop production across the regions is estimated to be $1.3 million annually. Of the total 32,000 af loss of CVP water, 21,000 af would be replaced by new groundwater pumping, and the remainder would come from land fallowing and reduced irrigation losses. Impacts during a dry year would be smaller than under the No Action Alternative due to the effect of increased irrigation efficiency.

The San Felipe Unit would experience a 2 percent reduction in CVP-supplied acreage and a similar reduction in value of production.

These estimates represent less than 1 percent of the total acreage and value in the two affected counties.

Mechanical Restoration. Impacts would be identical to the No Action Alternative.

State Permit.

Central Valley. Very little impact on irrigated acreage was estimated in any of the three Central Valley regions (Table 3-45). Small increases in CVP delivery relative to the No Action Alternative were largely offset by reduced groundwater pumping. A small average reduction in surface water available in the Tulare Basin results from imprecision in modeling assumptions, and does not result in significant changes in land use. Irrigated acreage and gross revenue were estimated to change by less than 0.5 percent.

In the San Felipe Unit, increased CVP delivery would increase CVP-supplied acreage by about 5 percent. This represents slightly more than a 1 percent increase relative to total harvested acreage in the two affected counties.

Existing Conditions versus Preferred Alternative. Most of the changes in agricultural land and water use between 1995 (i.e., existing conditions) and 2020 under the Preferred Alternative largely result from changes unrelated to the proposed action. CVP water supply declines 563,000 af on average under the Preferred Alternative, but 477,000 af of that also occurs under the No Action Alternative due to increased 2020 demands (see Section 2.1.2).

Surface-water delivery between 1995 and 2020 under the Preferred Alternative declines about 32,000 af in the Sacramento Valley, 320,000 af in the San Joaquin Valley, 206,000 af in the Tulare Basin, and 5,000 af in the San Felipe Unit (Table 3-45). Impacts to irrigated acres, gross revenue, and groundwater use follow the same pattern, with large impacts relative to existing conditions mostly accounted for by changes that also occur under the No Action Alternative. Impacts to irrigated acres would be less than 2 percent for all Central Valley regions, and would be about 10 percent of CVP-supplied lands in the San Felipe Unit (about 2.5 percent of all crop land in San Benito and Santa Clara Counties).

- **Mitigation.** Potentially significant land use (agricultural)-related impacts could occur as a result of decreased surface-water supplies associated with the San Felipe Unit for Maximum Flow and Flow Evaluation 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. A number of demand- and supply-related

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TABLE 3-45

Summary of Agricultural Land Use Impacts as Compared to the No Action Alternative

Resource Concern		No Action	Maximum Flow		Flow Evaluation		Percent Inflow		Mechanical Restoration	State Permit		Preferred Alternative	
			Amount	Percent	Amount	Percent	Amount	Percent	(Same as No Action)	Amount	Percent	Existing Conditions Amount	Percent Change from Existing Conditions
Sacramento Valley													
Irrigated Land (1,000 acres)	Average	2,016	-1.3	-0.1	-0.2	0.0	-0.1	0.0	N/C	0.2	0.0	2,005	.5
	Dry	1,992	3.1	.2	2.3	0.1	1.2	0.1	N/C	.5	0.0	1,966	1.4
Surface Water Applied (taf)	Average	4,523	-89.3	-2.0	-20.4	-0.5	-2.7	-0.1	N/C	14.0	0.3	4,534	-.7
	Dry	4,167	-96.3	-2.3	-65.3	-1.6	6.5	.2	N/C	34.6	0.8	4,187	-2.0
Groundwater Applied (taf)	Average[b]	2,574	69.4	2.7	16.3	0.6	1.6	0.1	N/C	-11.4	-0.4	2,665	-2.8
	Dry[a]	3,200	90.0	2.8	68.4	2.1	-4.8	-.2	N/C	-32.4	-1.0	3,250	.5
Value of Production (million $)	Average	2,138	-0.7	0.0	-0.1	0.0	0.0	0.0	N/C	0.1	0.0	1,922	11.2
	Dry	2,125	-.2	0.0	-0.3	0.0	0.3	0.0	N/C	-0.1	0.0	1,901	11.8
San Joaquin Valley													
Irrigated Land (1,000 acres)	Average	2,557	-8.8	-0.3	-1.6	-0.1	-0.5	0.0	N/C	0.1	0.0	2,640	-3.2
	Dry	2,530	4.0	.2	2.7	0.1	1.8	0.1	N/C	7.2	0.3	2,613	-3.1
Surface Water Applied (taf)	Average	4,436	-214.7	-4.8	-33.6	-0.8	-2.7	-0.1	N/C	46.6	1.1	4,722	-6.8
	Dry	3,726	-137.1	-3.7	-34.8	-0.9	18.7	0.5	N/C	148.1	4.0	3,955	-6.7
Groundwater Applied (taf)	Average	3,439	136.7	4.0	22.4	0.7	-0.3	0.0	N/C	-39.6	-1.2	3,729	-7.2
	Dry	4,595	97.2	2.1	38.0	0.8	-13.2	-0.3	N/C	-113.1	-2.5	4,979	-7.0
Value of Production (million $)	Average	5,195	-10.7	-0.2	-1.9	0.0	-0.6	0.0	N/C	0.0	0.0	4,494	15.6
	Dry	5,168	4.5	0.1	3.0	0.1	1.7	0.0	N/C	6.7	0.1	4,473	15.6
Tulare Basin													
Irrigated Land (1,000 acres)	Average	2,006	-3.8	-0.2	-1.1	-0.1	-0.6	0.0	N/C	0.1	0.0	2,049	-2.2
	Dry	1,963	9.1	.5	4.8	0.2	3.7	0.2	N/C	2.4	0.1	1,995	-1.3
Surface Water Applied (taf)	Average	2,673	-47.5	-1.8	-28.9	-1.1	-26.7	-1.0	N/C	-24.2	-0.9	2,850	-7.2
	Dry	1,712	-21.2	-1.2	-12.5	-0.7	-16.3	-1.0	N/C	7.9	0.5	1,885	-9.8
Groundwater Applied (taf)	Average	3,361	9.9	0.3	17.7	0.5	19.8	0.6	N/C	24.7	0.7	3,565	-5.2
	Dry	4,583	25.2	.5	20.5	0.4	23.7	0.5	N/C	0.0	0.0	4,766	-3.4
Value of Production (million $)	Average	4,557	-4.0	-0.1	-1.1	0.0	-0.7	0.0	N/C	0.1	0.0	3,868	17.8
	Dry	4,513	9.4	0.2	5.0	0.1	3.9	0.1	N/C	2.6	0.1	3,814	18.4
San Felipe Unit													
Irrigated Land (1,000 acres)	Average	24	-7.4	-31.1	-1.4	-6.0	-0.4	-1.6	N/C	1.2	5.2	25	-9.8
	Dry	17	-4.8	-27.7	-1.5	-8.5	0.3	1.7	N/C	4.7	26.9	18	-14.1
CVP Water Applied (taf)	Average	68	-14.8	-21.8	-2.9	-4.2	-0.8	-1.1	N/C	2.5	3.6	70	-6.9
	Dry	38	-9.9	-26.2	-3.0	-7.9	0.5	1.3	N/C	9.0	23.9	40	-12.9
Groundwater Applied (taf)	Average	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/C	N/A	N/A	N/A	N/A
	Dry	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/C	N/A	N/A	N/A	N/A

TABLE 3-45
Summary of Agricultural Land Use Impacts as Compared to the No Action Alternative

Resource Concern		No Action	Maximum Flow		Flow Evaluation		Percent Inflow		Mechanical Restoration	State Permit		Preferred Alternative	
			Amount	Percent	Amount	Percent	Amount	Percent	(Same as No Action)	Amount	Percent	Existing Conditions Amount	Percent Change from Existing Conditions
Value of Production (million $)	Average	98	-30.3	-31.1	-5.8	-6.0	-1.6	-1.6	N/C	5.0	5.2	102	-9.8
	Dry	63	-16.2	-25.8	-6.2	-9.9	2.3	3.6	N/C	23.7	37.8	68	-16.4
Most Affected Subregions – Tehama-Colusa Subregion													
Irrigated Land (1,000 acres)	Average	88	-0.9	-1.0	-0.2	-0.2	0.0	0.0	N/C	0.1	0.2	80	9.7
	Dry	81	-0.6	-0.8	-2.0	-2.4	-2.7	-3.3	N/C	-3.3	-4.2	65	20.0
Surface Water Applied (taf)	Average	225	-70.3	-31.2	-15.8	-7.0	-2.2	-1.0	N/C	11.1	4.9	201	4.3
	Dry	102	-73.0	-71.5	-50.0	-49.0	3.8	3.8	N/C	26.9	26.3	86	-39.5
Groundwater Applied (taf)	Average	57	57.5	100.1	12.6	21.9	1.8	3.2	N/C	-8.7	-15.1	60	15.9
	Dry	167	61.2	36.6	40.4	24.1	-13.9	-8.3	N/C	-37.3	-22.3	136	53.0
Value of Production (million $)	Average	80	-0.5	-0.6	-0.1	-0.1	0.0	0.0	N/C	0.1	0.1	66	19.7
	Dry	75	-0.4	-0.5	-1.3	-1.8	-1.8	-2.4	N/C	-2.3	-3.1	58	28.3
Most Affected Subregions – Westlands Subregion													
Irrigated Land (1,000 acres)	Average	525	-6.3	-1.2	-1.2	-0.2	-0.4	-0.1	N/C	-0.4	-0.1	501	4.5
	Dry	513	2.2	0.4	1.6	0.3	0.8	0.1	N/C	0.7	0.1	496	3.6
Surface Water Applied (taf)	Average	705	-153.8	-21.8	-30.0	-4.3	-8.4	-1.2	N/C	25.0	3.5	725	-6.9
	Dry	390	-101.7	-26.1	-30.1	-7.7	5.4	1.4	N/C	93.7	24.1	412	-12.8
Groundwater Applied (taf)	Average	727	121.7	16.7	23.3	3.2	6.2	0.9	N/C	-27.0	-3.7	689	8.9
	Dry	1,098	94.0	8.6	31.9	2.9	-4.1	-0.4	N/C	-92.4	-8.4	1,088	3.9
Value of Production (million $)	Average	1,501	-8.4	-0.6	-1.7	-0.1	-0.5	0.0	N/C	-0.5	0.0	1,059	41.1
	Dry	1,485	3.0	0.2	2.1	0.1	1.0	0.1	N/C	1.0	0.1	1,053	41.1

[a] Average annual values for a dry period (1928-1934)
[b] Average annual values for the 69-year period of simulation
Note: N/C = No Change

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.

3.9.3 Real Estate

This section assesses each of the alternatives from the perspective of residential real estate impacts. The evaluation focuses on residential properties adjacent to reservoirs and rivers.

Affected Environment.

Trinity River Basin. Trinity Reservoir is the only reservoir in this region where residential real estate impacts are expected. Lakeside development is limited to Trinity Center and Covington Mill, both of which are located on the west side of the reservoir along Route 3. The potentially affected reach of the Trinity River consists of the portion downstream of Lewiston Dam. A number of small residential communities are found along this reach including Lewiston, Douglas City, Junction City, Big Bar, Del Loma, Burnt Ranch, Salyer, and Willow Creek.

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Potential property value impacts at Trinity and Shasta Reservoirs were evaluated from both short- (drawdown) and long-term (fluctuation) perspectives.

Lower Klamath River Basin / Coastal Area. The affected area in this region is limited to the lower reach of the Klamath River downstream of Weitchpec. This area falls entirely within the boundaries of the Yurok Reservation.

Central Valley. Although there are numerous reservoirs and rivers in the Central Valley, real estate impacts are anticipated only at Shasta Reservoir. A moderate amount of development occurs primarily around the north end of the reservoir.

Environmental Consequences.

Methodology. Real estate impacts were assessed based on the assumed relationship between residential property values and both reservoir water levels and inriver fish harvests. Since information for quantifying changes to property values was unavailable, the speculated relationship allowed only for a ranking of the alternatives.

Potential property value impacts at Trinity and Shasta Reservoirs were evaluated from both short- and long-term perspectives. The short-term perspective focuses on the magnitude of drawdown. The assumption was made that the greater the drawdown, the greater the short-term adverse property value impact. Drawdown at Trinity and Shasta Reservoirs was measured by comparing PROSIM-based average annual water levels for each alternative to those of the No Action Alternative (Table 3-46 at the end of Section 3.9.3). As required by CEQA, information is also presented comparing existing conditions (1995) to the year 2020 under the Preferred Alternative. The long-term perspective focuses on annual and monthly water-level fluctuation based on the assumption that property owners could adjust to fixed drawdowns by planting vegetation, extending docks, etc. It was assumed that the greater the annual and monthly fluctuation, the greater the long-term adverse property value impact.

Based on the assumptions that people prefer to live along healthy rivers, and fish harvests reflect river health, naturally produced salmon and steelhead inriver fish harvests were used to rank potential impacts to Trinity River property values. Implicit in this assumption are higher flows and possible flooding; however, flooding effects were discounted under the assumption that such impacts would be mitigated (see Section 3.9.1). Impacts to property values along the lower Klamath River were not assessed because of the high level of uncertainty about a relationship between Trinity River fish harvests and lower Klamath land values.

Significance Criteria. Property value significance criteria were not established because of the uncertainty in estimating relationships between property values and reservoir water levels and inriver fish harvests.

No Action.

Trinity River Basin. The No Action Alternative assumes the current flow schedule would continue. Based on average water levels and annual monthly fluctuation, this alternative ranked fourth overall from the perspective of Trinity Reservoir property value impacts (Table 3-43). From a Trinity River property value perspective, this alternative ranked fifth.

Central Valley. This alternative ranked second overall from the perspective of Shasta Reservoir property values.

Maximum Flow.

Trinity River Basin. This alternative ranked second overall in terms of Trinity Reservoir property values. From the long-term perspective, this alternative ranked first; however, from the short-term perspective, this alternative ranked last. The alternative ranked first in terms of Trinity River property values (harvest levels were ten times those of No Action).

Central Valley. This alternative ranked last overall, in both the short- and long-term measures, from the perspective of Shasta Reservoir property values.

Flow Evaluation.

Trinity River Basin. From a Trinity Reservoir property value perspective, this alternative ranks first overall. From a Trinity River property value perspective, this alternative ranked second.

Central Valley. This alternative ranked fourth from the perspective of Shasta Reservoir property values.

Percent Inflow.

Trinity River Basin. This alternative ranked third overall in terms of Trinity Reservoir property values (tied with State Permit Alternative). From a Trinity River property value perspective, this alternative ranked third.

Central Valley. This alternative ranked third overall from the perspective of Shasta Reservoir property values.

Mechanical Restoration.

Trinity River Basin. This alternative ranked fourth overall in terms of Trinity Reservoir property values (tied with No Action due to the identical hydrology). This alternative also ranked fourth from a Trinity River property value perspective.

Central Valley. This alternative ranked second overall (same as No Action).

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State Permit.

Trinity River Basin. The State Permit Alternative ranked first based on short-term drawdown to Trinity Reservoir, but last based on long-term fluctuation. Overall, the alternative tied for third in terms of Trinity Reservoir property values. From a Trinity River perspective, the alternative ranked last.

Central Valley. This alternative ranked first overall from the perspective of Shasta Reservoir property values.

Existing Conditions versus Preferred Alternative.

The Preferred Alternative would increase property values (and)… property values along the river would increase (compared to 1995).

Trinity River Basin. In terms of Trinity Reservoir water levels, the Preferred Alternative in the year 2020 was virtually identical to 1995 conditions from the short-term drawdown perspective, but substantially better in terms of long-term fluctuations. Therefore, the Preferred Alternative would increase property values. Trinity River fish harvests are expected to increase under the Preferred Alternative compared to 1995; therefore, property values along the river should increase.

Central Valley. From both short-term and long-term perspectives, the Preferred Alternative would decrease Shasta Reservoir property values.

Mitigation. No significance criteria were identified; therefore, no mitigation is required.

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TABLE 3-46
Property Value Impact Ranking Summary

Locations/Measures	No Action	Compared to the No Action Alternative					Compared to Existing Conditions	
		Maximum Flow	Flow Evaluation	Percent Inflow	Mechanical Restoration	State Permit	Existing Conditions	Preferred Alternative
Trinity Reservoir Rankings								
Short-term Annual Average								
Water level	2,298	2,284	2,303	2,301	2,298	2,311	2,302	2,303
Change in water level		-14	+5	+3	0	+13		+1
NEPA rank	(4)	(5)	(2)	(3)	(4)	(1)		
Long-term Annual Range								
Water level	159	102	123	125	159	151	154	123
Change in water level		-57	-36	-34	0	-8		-31
NEPA rank	(5)	(1)	(2)	(3)	(5)	(4)		
Monthly Range								
Water level	61	36	60	62	61	64	66	60
Change in water level		-25	-1	+1	0	+3		-6
NEPA rank	(3)	(1)	(2)	(4)	(3)	(5)		
Overall Rank:	**4**	**2**	**1**	**3**	**4**	**3**	**n/a**	**n/a**
Shasta Reservoir Rankings:								
Short-term Annual Average								
Water level	1,016	1,006	1,013	1,015	1,016	1,018	1,018	1,013
Change in water level		-10	-3	-1	0	+2		-5
NEPA rank	(2)	(5)	(4)	(3)	(2)	(1)		
Long-term Annual Range								
Water level	109	193	125	111	109	111	108	125
Change in water level		+84	+16	+2	0	+2		+17
NEPA rank	(1)	(4)	(3)	(2)	(1)	(2)		
Monthly Range								
Water level	67	86	88	67	67	65		
Change in water level		+19	+21	0	0	-2	65	88
NEPA rank	(2)	(3)	(4)	(2)	(2)	(1)		+23
Overall Rank:	**2**	**5**	**4**	**3**	**2**	**1**	**n/a**	**n/a**
River Rankings								
Fish harvest	1,820	18,200	15,100	5,250	3,830	0	1,820	15,100
Change in harvest		+16,380	+13,280	+3,430	+2,010	-1,820		+13,280
NEPA rank	(5)	(1)	(2)	(3)	(4)	(6)	n/a	n/a

[a] Change in annual inriver natural harvest of chinook, coho, and steelhead fish populations.

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