

**Chapter 3L. Affected Environment and Environmental
Consequences - Traffic and Navigation**

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SUMMARY

This chapter assesses the impacts of the DW project alternatives on traffic congestion, traffic circulation and access, and safety on roads and waterways in the project area during construction and operation of the DW project alternatives. Impacts of the DW project alternatives on the physical roadway structure are assessed in Chapter 3E, “Utilities and Highways”.

As described in Chapter 2, “Delta Wetlands Project Alternatives”, DW has removed construction of recreation facilities from its CWA permit applications, and USACE will not include the construction of such facilities in permits issued for the project at this time. However, it is anticipated that DW would subsequently apply for CWA and Rivers and Harbors Act permits for some or all of these recreation facilities. The analysis of impacts on traffic and navigation assumes that the recreation facilities would be constructed and operated. The information in this chapter provides readers with a complete record of the environmental analysis; it may be used in subsequent environmental assessment of the recreation facilities.

Implementation of Alternative 1, 2, or 3 would result in significant and unavoidable impacts on vehicle and boat traffic and congestion during project operation. The primary source of vehicle and boat traffic during project operation would be summer recreation use of the DW project facilities. Reducing the number of new boat slips associated with the Delta Wetlands recreation facilities would reduce vehicle and boat traffic generated by the project, but not to a less-than-significant level. Increased boat-traffic congestion would contribute to waterway safety problems in Delta channels. Clear posting of waterway intersections, speed zones, and potential boating hazard areas, as well as enforcement of boating regulations, would reduce potential safety problems near proposed recreation facilities to a less-than-significant level.

Project construction under Alternative 1, 2, or 3 could also result in the creation of significant safety conflicts on Delta roadways and waterways. The addition of construction vehicles to roadway traffic and the use of large barges in Delta waterways would affect vehicle and boat safety. Clearly marking roadway intersections with poor visibility in the DW project vicinity, marking and lighting barges at the DW project islands, and notifying the U.S. Coast Guard of construction activities would mitigate these construction-related impacts to less-than-significant levels.

Reducing agricultural vehicle traffic on Delta roadways during DW project operation would reduce safety conflicts between agricultural vehicles and other traffic. This is considered a beneficial impact of Alternatives 1, 2, and 3. Additionally, implementation of Alternative 1, 2, or 3 would result in less-than-significant impacts on peak-hour traffic and circulation during project construction and on waterway navigation conditions during project operations.

In combination with future traffic increases from other sources, the increase in traffic generated by Alternative 1, 2, or 3 would contribute to a significant cumulative impact on traffic congestion on Delta roadways. Implementing Caltrans’ route concepts for SR 4 and SR 12 would reduce this impact to a less-than-significant level. Increased safety problems on Delta waterways as a result of increasing recreation use, combined with recent funding cutbacks for marine patrol services in the Delta, would constitute a significant and unavoidable cumulative impact.

Under the No-Project Alternative, peak-hour traffic volumes would slightly increase because of increased agricultural production. Agricultural vehicle traffic on Delta roadways would also increase, creating potential safety

conflicts on roads in the DW project vicinity. Clearly marking intersections with poor visibility in the vicinity of agricultural operations would not be required, but could reduce this effect. Circulation on Delta roadways could be decreased by the addition of more slow-moving agricultural vehicles. Restricting agricultural vehicles from using Delta highways during peak hours would reduce this effect of the No-Project Alternative, but implementation of this measure would not be required.

CHANGES MADE TO THIS CHAPTER FOR THE FINAL ENVIRONMENTAL IMPACT STATEMENT

This chapter has been revised to include updated information about existing conditions in the Delta, including:

- # use of the ferry serving Webb Tract and funding sources for the Delta Ferry Authority,
- # commercial and transit purposes of Delta waterways, and
- # fog conditions on Delta roads and channels.

The impact analysis has been revised to include an analysis of traffic volumes for Jersey Island Road, the approach road to the Webb Tract Ferry.

Mitigation measures for project effects on roadway and waterway traffic and safety have been revised in response to recommendations made by the local counties, the California Department of Boating and Waterways, and the California Department of Transportation (Caltrans). Lastly, in an effort to reduce roadway and waterway traffic associated with increased recreational boating use in the Delta attributable to the proposed project, the EIR/EIS lead agencies and the project proponent developed a new mitigation measure for the final environmental document that requires DW to reduce the total number of outward (channel-side) boat slips proposed on the DW islands by 50%.

AFFECTED ENVIRONMENT

This section describes the existing roadway and waterway system and traffic conditions on and in the vicinity of the DW project islands. Information on the roadway system and traffic conditions is based, in part, on information collected for the 1990 draft EIR/EIS. Where conditions have not changed, this information has been used to describe current conditions. The description of the roadway and waterway system and traffic conditions has been updated, however, to reflect changes in traffic access.

Sources of Information

Information on the current traffic environment in the DW project vicinity was compiled from various sources. The main source of information used for roadway traffic is Caltrans. Information on waterway traffic and safety comes from data, reports, and

conversations with the California Department of Boating and Waterways, the State Lands Commission, San Francisco Estuary Project, SWRCB, the Delta Protection Commission, and Delta marina operators.

Existing Roadway System

The Delta is served by a network of county roads, private roads, and state highways. SR 12, Interstate 5 (I-5), SR 4, and SR 160 serve the project vicinity. In addition, ferries provide transportation between islands that do not have bridges. Transportation facilities in the DW project area are described below and are shown in Figure 3L-1.

Bacon Island

Bacon Island Road, the only public road to Bacon Island, provides access from SR 4 to Bacon Island from the east. As it approaches Bacon Island, Bacon Island

Road is a narrow, two-lane, east-west road with no shoulder and speeds posted at 15-30 miles per hour (mph) at sharp turns. Access to Bacon Island via Bacon Island Road is provided by the Bacon Island bridge over Middle River. At the time that the 1995 DEIR/EIS was prepared, the bridge was a one-lane facility with signals on the east and west approaches and carried very little traffic. San Joaquin County obtained funding and necessary approvals to construct a new Bacon Island bridge; construction began in April 1994 and has been completed (Vidad pers. comm.).

On Bacon Island, Bacon Island Road is a narrow, winding, north-south levee road with a posted speed limit of 25 mph. Bacon Island Road provides access to the Bullfrog Landing Marina and agricultural properties on the island. The public portion of Bacon Island Road ends at the north end of Bacon Island at a bridge to Mandeville Island. Beyond the bridge, a private dirt/gravel road extends to the western edge of Bacon Island.

SR 4 provides access between Bacon Island Road, Stockton, and the Sierra Nevada foothills to the east, and Brentwood and Antioch to the west. SR 4 is a two-lane, east-west highway with wide shoulders and a two-way left-turn lane east of the San Joaquin River but without a two-way left-turn lane across most of the Delta. SR 4 is a levee-top road at its intersection with Bacon Island Road.

Webb Tract

There are no roads providing access to Webb Tract; the Jersey-Bradford-Webb ferry, operated by the Delta Ferry Authority, provides ferry service to Webb Tract and Bradford Island from Jersey Island. Jersey Island Road provides access to the ferry on Jersey Island. Jersey Island Road is mostly unpaved and winds along the levee with scarcely enough room for two vehicles to pass in some areas.

The Delta Ferry Authority operates the Jersey-Bradford-Webb ferry each hour from 8:00 a.m. to 5:00 p.m., Monday through Friday during fall, winter, and spring, and Friday through Tuesday during summer. During fiscal year 1998-1999, the total number of passengers using the ferry was 21,938 (California Office of the Controller 2000). Based on this figure, average use for that year is estimated to have been approximately 85 passenger trips per day. The ferry system is funded

through the Delta Ferry Authority. The Delta Ferry Authority is composed of Contra Costa County, Webb Tract Reclamation District, and Bradford Reclamation District. Each reclamation district provides approximately \$50,000 per year in funding for the ferry service (Heringer pers. comm.), while Contra Costa County collects approximately \$15,000 per year in local funds to support the ferry service (Cutler pers. comm.) The Delta ferry authority collects these monies to fund operation of the ferry.

Although there are no roads providing access to Webb Tract, private interior roads exist on Webb Tract to provide a way for vehicles to circulate once they are on the island.

Bouldin Island

SR 12 crosses the north side of Bouldin Island from east to west, providing access to Fairfield and Napa to the west and extending to Lodi and the foothills to the east. On the island, SR 12 is a narrow-shouldered, two-lane highway across the island bottom, at 10-15 feet below water level in the exterior channels. In addition to SR 12, several narrow private interior roads provide access to agricultural operations on the island.

At the east end of Bouldin Island, SR 12 crosses Little Potato Slough on a two-lane swing bridge that has an approximately 35-foot clearance for boats. The speed limit is 55 mph on this segment of SR 12 (Simon pers. comm.). Access to the private dirt levee roads on Bouldin Island north and south of SR 12 is available approximately 0.25 mile west of the bridge. At the west end of the island, SR 12 crosses the Mokelumne River on a swing bridge.

Holland Tract

Just north of the town of Brentwood in Contra Costa County, the east-west Delta Road turns north; crosses Rock Slough on a narrow, one-lane wooden bridge; and becomes Holland Tract Road. Holland Tract Road is a narrow, two-lane levee road that enters the southwest corner of Holland Tract. Since 1991, access northward on the west levee has been blocked by a locked gate. To the east, the county road runs along the southern levee to the Holland Tract Marina, located at the southeast corner of the island. At the marina, the county road ends at a locked gate. In 1993,

the Contra Costa County Department of Public Works abandoned responsibility for those sections of Holland Tract Road along the east and west perimeter levees beyond the locked gates; these are now private roads (Figure 3L-1). The posted speed limit is 35 mph on the public access portion of Holland Tract Road on the southern perimeter levee and is 25 mph at the marina. Additionally, private interior roads provide access to agricultural operations on the island.

Existing Traffic Conditions

Traffic level of service (LOS) was evaluated along four two-lane highway segments in the DW project vicinity. Three of these segments are on SR 4 and one is on SR 12. These roadway segments were chosen for evaluation because they are located at the major access points to each island.

LOS criteria for two-lane highways address mobility and accessibility concerns. The primary measures of LOS are amount of delay, speed, and capacity utilization. Two-lane highway capacities vary depending on terrain and the degree of passing restrictions. The LOS ranges for two-lane highways, shown in Table 3L-1, are given in terms of a constant ideal capacity of 2,800 total passenger cars per hour.

Existing traffic volumes (Table 3L-2) and LOS ranges (Table 3L-1) were used to determine existing LOS on these project vicinity roadways (Table 3L-3). The roadway segments evaluated are on flat terrain and have no-passing zones on 20% of the roadway lengths, as determined during field observations. SR 12 on Bouldin Island currently operates at LOS D, indicating some delay in traffic operations. Narrow shoulders, passing restrictions, and heavy truck traffic (14%) all contribute to the LOS on SR 12. SR 4 in the project vicinity operates in the LOS C-D range. Caltrans considers LOS D, E, and F to be unacceptable. Therefore, existing LOS is acceptable on SR 4 east of Tracy Boulevard and is unacceptable on all other roadway segments analyzed.

Waterway Traffic and Safety

Boat-related recreational activity in the Delta has increased over recent years. The number of registered boats in California is approximately 841,300

(California Department of Motor Vehicles 1995). Of these, approximately 38,330, or 4.6%, are registered in Contra Costa County, and 22,780, or 2.7%, are registered in San Joaquin County. The Delta supports approximately 140 commercial and public recreation facilities (see Figure 3J-1 in Chapter 3J, "Recreation and Visual Resources"). There are more than 80 public and private marinas in Contra Costa and San Joaquin Counties. Because of population growth in the Sacramento and Stockton areas and the Bay Area, the number of recreational boat users has grown considerably. Boating is the primary recreational activity in the Delta and makes up approximately 17% of the Delta's total recreational use (see Chapter 3J, "Recreation and Visual Resources"). Boating traffic in the Delta also includes commercial, residential, and emergency service traffic. Fisherman's Cut and False River, for example, are used to transport large barges, tugs, cranes, and other types of equipment. Bradford Island residents use the channels as a "freeway" to commute to work and to shopping locations. Police and fire services also use the waterways for emergency response to various locations in the Delta.

Boat traffic congestion is found along Delta waterways and is often found at and around launch ramps and boat berthing areas. The California Department of Boating and Waterways requires that boats traveling within 200 yards upstream or downstream of boat docks maintain speeds of less than 5 mph. Restricted speeds, combined with boats moving into and out of waterways, create boat congestion on days of heavy recreational use (e.g., summer and holiday weekends).

A study of boating safety in the Delta shows that most safety problems on waterways are a result of:

- # boaters having limited knowledge and experience,
- # boats traveling at excessive speeds that create large wakes, and
- # a lack of uniformity existing in signs regulating boat speeds and other boater information.

Boaters and enforcement agencies also agree that obscured visibility at intersecting waterways and the operation of vessels by boaters under the influence of alcohol and/or drugs contribute to unsafe waterway conditions and boating accidents. In 1993, 743 boating accidents occurred on California waterways. Of these,

36 and 34 boating accidents occurred in Contra Costa County and San Joaquin County, respectively. Figure 3L-2 shows the locations of accidents reported in the Delta between 1981 and 1985. (California Department of Boating and Waterways 1986.)

Fog is common during the winter months throughout the Delta. Fog may sometimes settle low on bodies of water (i.e., Delta channels) when there is little or no wind, creating a dense fog condition in that localized area. Marine navigation in the Delta can be difficult during periods of dense fog. However, according to the U.S. Coast Guard, the level of boating activity and the need for search and rescue efforts during the winter months is relatively low compared with the need in summer months (Undieme pers. comm.). Boaters who use the Delta in the winter are generally experienced in boating, carry navigational equipment, and are familiar with marine navigation in foggy weather (Undieme pers. comm.).

Air Traffic from Bouldin Island

A small private airstrip is located on the east side of Bouldin Island, south of SR 12, and runs generally east-west. The airstrip is currently used for agricultural activities on Bouldin Island, Holland Tract, and Webb Tract. The airstrip is currently used primarily for aerial application of wheat and corn seed, urea fertilizer, and herbicides. Some aerial observation flights are also made from the airstrip. Most of the agricultural flights are made from mid-November through mid-March. However, corn herbicide is applied in late spring or early summer, so a few flights are made during that time. Approximately 750 landings and takeoffs (a landing and a takeoff in combination are counted as one) occur annually from the airstrip, with more than 80% of those flights occurring during the period of mid-November to mid-March.

IMPACT ASSESSMENT METHODOLOGY

Analytical Approach and Impact Mechanisms

In this analysis, impacts on roadway traffic and waterway traffic were assessed. As described above, DW has removed construction of recreation facilities

from its CWA permit applications, and USACE will not include the construction of such facilities in permits issued for the project at this time. Nevertheless, the analysis of impacts on roadway traffic and waterway traffic assumes that the recreation facilities would be constructed and operated. The methods and assumptions used in this analysis are described below.

Roadway Traffic

Impacts related to congestion, circulation, and access were analyzed for this chapter; they are the major indicators of traffic conditions in a given area. Safety impacts were also analyzed because of the potentially dangerous conditions associated with the addition of large construction or agricultural vehicles to semirural roadways.

There are two periods of impact assessed in this chapter: construction, which is temporary, and operation, which is long term. In both cases, impacts were analyzed through comparison between LOS for each DW project alternative and future (2010) without-project LOS. It should be noted that the No-Project Alternative includes intensified agricultural activities and is not the same as future without-project conditions. Future without-project conditions represent traffic levels that would exist in 2010 if the DW project were not implemented and the intensified agricultural activities associated with the No-Project Alternative did not occur. Future without-project conditions are used as a basis for comparison in order to determine the increment of change directly related to implementation of the DW project. If, for example, traffic levels related to an earlier year were used for comparison, it would not be possible to determine which portions of estimated changes in traffic levels under a DW project alternative were attributable to the DW project and which were attributable to other unrelated activities.

Construction Impacts. Construction impacts consist of impacts related to traffic congestion, safety, circulation, and access occurring during the estimated 1.5-year project construction period (the construction period is assumed to be approximately 2.5 years long under Alternative 3 on Bouldin Island). The construction period may be longer than 1.5 calendar years (see Chapter 3D, "Flood Control"), but the shorter period is assumed in the traffic analysis to represent total construction days and to estimate a worst-case traffic scenario in which all construction traffic would occur in a short time frame. Although existing farming

activities would gradually be phased out over the period of construction, under the worst-case scenario, it is assumed that some of the existing farming activities would still be conducted throughout the construction period. Because construction-related impacts would occur only during the period of construction, they are considered short-term impacts. Construction-related congestion impacts were analyzed through comparison between LOS for the period of DW project construction and future without-project LOS. Construction-related safety, circulation, and access impacts were analyzed qualitatively.

Operation Impacts. Operation-related impacts consist of impacts on traffic congestion, safety, and circulation during the life of the DW project (access to the DW project islands is expected to be a potential issue only during construction). Congestion was analyzed through comparison between LOS during operation of the DW project and future without-project LOS. Operation-related safety and circulation impacts were analyzed qualitatively.

Future without-project LOS was determined in two different ways. For the segment of SR 12 west of Terminous and the segment of SR 4 east of Tracy Boulevard, LOS was supplied by Caltrans (Chalk pers. comm.). For all other roadway segments, LOS was calculated using future without-project volumes and an assumed capacity of 2,800 cars per hour to determine the volume-to-capacity (V/C) ratio (Transportation Research Board 1985). For Jersey Island Road, LOS was calculated using an assumed capacity of 500 cars per hour to determine the V/C ratio. The V/C ratio is defined as the ratio of the volume of cars traveling on a roadway to the maximum capacity of that roadway. Table 3L-1 was then used to determine LOS based on the calculated V/C ratio. It was assumed that roadways analyzed are on flat terrain and that no passing is allowed on 20% of the length of the roadways.

LOS under the DW project was calculated the same way that future without-project LOS was calculated. However, the volumes used were the totals of the future-year without-project volumes supplied by Caltrans plus the number of trips that would be generated by the DW project alternatives.

Trip Generation and Distribution. Trips generated by the DW project alternatives are shown in Table 3L-4. Sources of traffic under existing conditions and the No-Project Alternative are recreationists and agricultural operations. Sources of traffic under

Alternatives 1, 2, and 3 are recreationists, agricultural operations, and project maintenance activities. Vehicle travel between recreation facilities and the Bouldin Island airstrip was not included in the sources of traffic. Although agricultural and recreation-related traffic would not peak during the same months, all sources of traffic were combined to make this a worst-case analysis. Peak-hour trips are vehicle trips made during the hour of the day with the greatest traffic volume. Commonly, an approximately 10:1 relationship exists between daily traffic and peak-hour volumes. Therefore, it was assumed that 10% of daily trips would operate during the peak hour. For a more detailed breakdown of trip generation, see Appendix L1, "Estimated Trip Generation".

Agriculture- and construction-related trip generation estimates were provided by the project proponent, and recreation-related trip generation was calculated for existing conditions and Alternatives 1 and 3 and the No-Project Alternative as described below. Recreation-related trip generation for Alternative 2 would be almost identical to recreation-related trip generation for Alternative 1.

Vehicle and boat trip generation was estimated for recreation-related use for all seasons of recreational activity (Table 3L-5). These estimates, described in the following sections, were used to determine the season with the greatest amount of recreational trip generation.

Under existing conditions and the No-Project Alternative, the hunting season would be the peak recreation season (see Chapter 3J, "Recreation and Visual Resources"). Therefore, trips generated by recreational activities under existing conditions and the No-Project Alternative were estimated based on estimates of hunting activities during the hunting season. Under Alternatives 1 and 3, summer would be the peak recreation season (see Chapter 3J). Boating, fishing, hunting, and other miscellaneous recreational activities were included in the analysis of trip generation for recreation, as described below. However, because summer is the peak recreation season assessed for the traffic analysis for Alternatives 1 and 3, hunting is not included as a source of recreation-related trips for the peak use impact assessment for these alternatives because hunting would not occur during summer.

Existing Conditions and the No-Project Alternative. Hunting-related vehicle trips were estimated for existing conditions and the No-Project

Alternative using the number of annual hunter use-days expected on the DW project islands (Table 3J-2 in Chapter 3J, "Recreation and Visual Resources"). One hunter use-day represents participation by one individual in hunting activities for any portion of a 24-hour period. The following assumptions were used to determine annual hunting-related vehicle trips:

- # Hunters would not stay overnight; therefore, each hunter use-day represents one hunter.
- # Vehicle occupancy would be two people per vehicle.
- # Each vehicle would make two trips (one trip to the island and one trip back).

The annual number of vehicle trips was then divided by the number of days that hunting is or would be allowed in a year, giving the average number of recreation-related vehicle trips occurring per day during the hunting season. The number of days hunting would be allowed during the year was assumed to be the same for existing conditions and the No-Project Alternative, as shown for the No-Project Alternative in Table 3J-16.

Alternatives 1 and 3. Hunting-related vehicle trip generation for Alternatives 1 and 3 was estimated in the same manner as for existing conditions. However, the DW project alternatives would include lodging facilities for hunters; therefore, the number of hunters was estimated based on the following assumptions: an overnight hunter accounts for two hunter use-days, 70% of the hunters would stay overnight at the project facilities, and the remaining 30% of the hunters would come for day use only. Also, it was assumed that 10% of the hunters using Webb Tract would travel by private boats and would not use the ferry.

Estimates of annual hunter use-days shown in Table 3J-11 in Chapter 3J were used for the trip generation analysis for Alternatives 1 and 3. These numbers represent the maximum amount of hunting that would occur during the approximately 5- to 15-year period following project start-up. After this initial period, hunting activity on the DW project islands is expected to decrease. These maximum numbers were used for a worst-case analysis. Additionally, the number of days that hunting would be allowed in future years under each alternative was taken from Tables 3J-3, 3J-4, 3J-12, 3J-13, 3J-14, 3J-15, and 3J-16 in Chapter 3J. Depending on the alternative and the island under consideration, the number of days on

which hunting would be allowed varied from 47 to 86 days per year.

Hunting also would result in boating on the interior of the project islands under Alternatives 1 and 3. Trip generation for hunting-related boating was estimated based on the number of hunters expected to use the project islands each day, assuming an occupancy of two people per boat. This activity is not considered a part of pleasure boating activities, which would take place in the Delta on the exterior of the DW project islands. Additionally, hunting-related boat trips would be much shorter in duration, and boats used for hunting are smaller than pleasure boats.

Boating activity associated with Alternatives 1 and 3 would result in both vehicle traffic and boat traffic. Trip generation for boating-related boats and vehicles for Alternatives 1 and 3 was estimated for each season using peak-use estimates for each season. Boating activity is the largest source of vehicle trip generation under Alternatives 1 and 3 during the summer. Boat berths that would be constructed under the DW project alternatives are projected to have an average boat occupancy rate of 70% (see Chapter 3J, "Recreation and Visual Resources"). Estimates of the percentage of docked boats that are used on a peak day were used to estimate the total number of boats that would be used per peak day for each season under Alternatives 1 and 3. Estimates were based on the assumptions that each boat would complete two trips each day, and that the occupancy rate would be three people per boat.

The numbers of boating-related vehicle trips under Alternatives 1 and 3 were calculated based on the numbers of boaters (assuming three boaters per boat), the number of peak-day boat trips, and an occupancy rate of two people per car. Therefore, the number of boating-related vehicle trips would be 1.5 times the number of boat trips during every season except hunting season. Because 5% of the hunters are assumed to engage in pleasure boating, 5% of the hunting-related vehicle trips were subtracted from the boating-related vehicle trips during the hunting season.

Generation of vehicle trips related to other recreational activities under Alternatives 1 and 3 was estimated for each season using the number of recreationists other than boaters or hunters expected to use each island. This number was estimated in relation to the number of boaters expected to use the islands. See Chapter 3J, "Recreation and Visual Resources", for further explanation of this estimate. It was assumed

that 90% of these recreationists would drive to the islands or, in the case of Webb Tract, to the ferry. A vehicle occupancy of two people per car was assumed.

It should be noted that all trips referred to in this chapter and in Chapter 3O, "Air Quality", are one-way trips. It should also be noted that the vehicle-to-boat trips included in this analysis are not vehicle trips made to the ferry, but are vehicle trips made to private boats. However, all vehicle trips made "directly" to Webb Tract are actually vehicle trips made to the Jersey-Bradford-Webb ferry, which would transport the vehicles and passengers to Webb Tract. These vehicle trips should not be confused with vehicle trips made to private boats going to Webb Tract.

Also, harvest vehicle trips are distinguished from nonharvest agricultural trips by the fact that harvest trips are made to deliver harvested crops. Nonharvest agricultural trips include all other agricultural trips.

Table 3L-4 shows peak-hour trip generation for existing conditions; Alternatives 1, 2, and 3; and the No-Project Alternative. Trips generated by the DW project were assigned to roadway segments based on the following trip distribution assumptions:

- # 50% of all trips generated by the DW project approach the project area from the west, and the other half approach it from the east;
- # 100% of all DW project trips generated by Bacon Island use Bacon Island Road;
- # 100% of all DW project trips generated by Bouldin Island use SR 12 west of Terminous; and
- # 50% of all DW project trips generated by Bacon Island, Webb Tract, and Holland Tract use SR 4 east of Tracy Boulevard, SR 4 south of Cypress Road, and SR 4 south of Delta Road.

The first assumption listed above is based on the understanding that there are population centers and appropriate work forces located to both the east and west of the DW project site and the assumption that it is equally likely that recreationists and DW workers would come from one direction as from the other. All the other assumptions listed above follow from the first assumption.

Waterway Traffic and Safety

The number of boat trips expected to occur per day during construction and operation of the DW project are shown in Table L1-2 of Appendix L1, "Estimated Trip Generation". The numbers of boat trips expected to occur per day under existing conditions and the No-Project Alternative are shown in Tables L1-1 and L1-3 of Appendix L1, respectively. Boat trip estimates are based on the proposed recreation facility design (see Figures 2-7 and 2-8 in Appendix 2, "Supplemental Description of the Delta Wetlands Project Alternatives") and projected use of the facilities (see Chapter 3J, "Recreation and Visual Resources"). The analysis addresses project effects on waterway traffic, safety, and navigability in Delta waterways during construction and operation. Waterway traffic and safety would be affected by changes in boat use in the Delta and changes in the condition of channels adjacent to the DW project islands.

Criteria for Determining Impact Significance

Traffic Congestion

An alternative is considered to have a significant impact if it would cause a roadway segment to go from one LOS under future without-project conditions to a lower LOS during construction or operation of the project (e.g., from LOS B to LOS C). Additionally, an alternative is considered to have a significant impact if it would add 25 or more vehicle trips to the peak-hour volume on a roadway segment with an already unacceptable LOS (estimated for future without-project conditions). This 25-trip threshold is based on the San Joaquin County Congestion Management Plan (San Joaquin County Council of Governments 1991), which states that a project would have a significant impact if it would result in the addition of 250 or more trips to the daily traffic volume. Using the 10:1 ratio for daily to peak-hour traffic volume, a 25-trip peak-hour volume threshold was derived from the daily threshold. Although this criterion is designed for use with general plans and general plan amendments, it is appropriate for use on other types of projects as well (VanDenburgh pers. comm.). Although not all roadways assessed in this analysis are located in San Joaquin County, this criterion was considered appropriate for use on all the roadways analyzed. According to the San Joaquin County General Plan, an

LOS of E or F is an unacceptable LOS on all state highways in the Delta portion of San Joaquin County. Furthermore, an LOS of D, E, or F is unacceptable on all other San Joaquin County roadways in the Delta (San Joaquin County Community Development Department 1992). According to the Contra Costa County Transportation Authority, unacceptable LOS on non-freeway segments of SR 4 in Contra Costa County is LOS F (Engelmann pers. comm.). All roadway segments located in Contra Costa County analyzed in this chapter are non-freeway segments of SR 4.

Conversely, an alternative is considered to have a beneficial impact if it would cause a roadway segment to go from one LOS under future without-project conditions to a higher LOS during construction or operation of the project. Additionally, an alternative is considered to have a beneficial impact if it would remove 25 or more vehicle trips from the peak-hour volume on a roadway segment with an already unacceptable LOS.

Traffic Safety

An alternative is considered to have a significant impact if it would result in the operation of additional large trucks or other equipment on Delta roadways during construction or operation, compared with future without-project conditions. Conversely, an alternative is considered to have a beneficial impact if it would result in the removal of any large trucks or other equipment from operation on Delta roadways during construction or operation, compared with future without-project conditions.

Traffic Circulation and Access

An alternative is considered to have a significant impact if it would limit access to the project site or along haul routes during construction. An alternative is also considered to have a significant impact if it would alter circulation patterns on highways in the project vicinity during construction or operation.

Waterway Traffic and Safety

An alternative is considered to have a significant impact on waterway traffic or safety if it would:

- # substantially increase boat traffic on waterways in the DW project vicinity during construction or operation,
- # adversely affect boat navigation in Delta waterways by altering physical conditions in a channel,
- # involve the permanent placement of an obstruction greater than one-third the width of the channel in waterways surrounding the DW project islands during construction or operation, or
- # increase the potential for boating accidents to occur in waterways surrounding the DW project islands during project construction or operation.

IMPACTS AND MITIGATION MEASURES OF ALTERNATIVE 1

Alternative 1 involves storage of water on Bacon Island and Webb Tract (reservoir islands) and management of Bouldin Island and Holland Tract (habitat islands) primarily for wildlife habitat. Reservoir islands would be managed primarily for water storage, with wildlife habitat and recreation constituting secondary uses. The impacts of Alternative 1 on traffic conditions in the DW project area are described below. In cases in which an impact is designated as significant, mitigation is recommended if available.

Level of Service on Delta Roadways

Traffic generated during construction under Alternative 1 would consist of vehicles carrying workers to the project sites and trucks bringing materials to the project sites. The sources of traffic generated during operation of Alternative 1 are recreation, agriculture, and project maintenance activities. See Table L1-2 in Appendix L1 for estimates of the number of trips that would be generated on each island during construction and operation of Alternative 1.

Alternative 1 involves the potential sale of water stored on the reservoir islands. If water sales do occur, water would be transferred through existing pipelines

and aqueducts to the purchaser. Therefore, implementation of Alternative 1 would not generate traffic associated with transport of water.

Bacon Island

Construction. As shown in Table 3L-6, the estimated peak-hour volume on Bacon Island Road at the Bacon Island bridge during construction under Alternative 1 is 241 and under future without-project conditions is 234. As shown in Table 3L-7, this roadway would operate at LOS A under future without-project conditions and during construction under Alternative 1.

As shown in Table 3L-6, the estimated peak-hour volume on SR 4 east of Tracy Boulevard during construction under Alternative 1 is 1,109 and under future without-project conditions is 1,100. As shown in Table 3L-7, the LOS on this roadway segment would be D under future without-project conditions and during construction under Alternative 1.

Operation. As shown in Table 3L-6, the estimated peak-hour volume on Bacon Island Road at the Bacon Island bridge during operation of Alternative 1 is 290 and under future without-project conditions is 234. As shown in Table 3L-7, the LOS on this roadway segment would be A under future conditions with and without Alternative 1.

As shown in Table 3L-6, the estimated peak-hour volume on SR 4 east of Tracy Boulevard during operation of Alternative 1 is 1,171 and under future without-project conditions is 1,100. As shown in Table 3L-7, the LOS on this roadway segment would be D under future conditions with and without Alternative 1.

Webb Tract

Construction. As shown in Table 3L-6, the estimated peak-hour volume on SR 4 south of Cypress Road during construction under Alternative 1 is 2,741 and under future without-project conditions is 2,732. As shown in Table 3L-7, the LOS on this roadway segment would be E under future without-project conditions and during construction under Alternative 1.

Operation. As shown in Table 3L-6, the estimated peak-hour volume on SR 4 south of Cypress Road during operation of Alternative 1 is 2,803 and

under future without-project conditions is 2,732. As shown in Table 3L-7, the LOS on this roadway segment would be E under future without-project conditions and F under Alternative 1 conditions.

Bouldin Island

Construction. As shown in Table 3L-6, the estimated peak-hour volume on SR 12 west of Terminous during construction under Alternative 1 is 2,903 and under future without-project conditions is 2,900. As shown in Table 3L-7, the LOS on this roadway segment would be F under future without-project conditions and during construction under Alternative 1.

Operation. As shown in Table 3L-6, the estimated peak-hour volume on SR 12 west of Terminous during operation of Alternative 1 is 2,949 and under future without-project conditions is 2,900. As shown in Table 3L-7, the LOS on this roadway segment would be F under future conditions with and without Alternative 1.

Holland Tract

Construction. As shown in Table 3L-6, the estimated peak-hour volume on SR 4 south of Delta Road during construction under Alternative 1 is 2,847 and under future without-project conditions is 2,838. As shown in Table 3L-7, the LOS on this roadway segment would be F under future without-project conditions and during construction under Alternative 1.

Operation. As shown in Table 3L-6, the estimated peak-hour volume on SR 4 south of Delta Road during operation of Alternative 1 is 2,909 and under future without-project conditions is 2,838. As shown in Table 3L-7, the LOS on this roadway segment would be F under future conditions with and without Alternative 1.

Summary of Project Impacts and Recommended Mitigation Measures

Impact L-1: Increase in Traffic on Delta Roadways during Project Construction. Implementation of Alternative 1 would slightly increase peak-hour volumes during project construction. However, the increase in volume would be less than 25 trips on all roadways analyzed. Furthermore, the LOS letter grade

would not be affected on any of the roadways analyzed. Therefore, this impact is considered less than significant.

Mitigation. No mitigation is required.

Impact L-2: Increase in Traffic on Delta Roadways during Project Operation. Implementation of Alternative 1 would increase peak-hour volumes during project operation. As shown in Table L1-2 of Appendix L1, the majority of trips generated under Alternative 1 would be generated by summer recreationists (e.g., boaters). The increase in peak-hour volume would be more than 25 trips on all roadways analyzed. Of these roadways, two have unacceptable LOS under future without-project conditions, including SR 12 west of Terminous and SR 4 south of Delta Road (see Table 3L-7). Therefore, implementation of Alternative 1 would result in the addition of more than 25 peak-hour trips to roadway segments with already unacceptable LOS under future without-project conditions. Additionally, LOS would be reduced by a letter grade, from E to F, on SR 4 south of Cypress Road; and from A to B, on Jersey Island Road north of Dutch Slough Road. Therefore, this impact is considered significant and unavoidable.

Implementation of Mitigation Measure RJ-1 would reduce impact L-2 but not to a less-than-significant level”.

Mitigation Measure RJ-1: Reduce the Number of Outward Boat Slips Located at Recreation Facilities. Delta Wetlands shall reduce the total number of outward (channel-side) boat slips proposed on the Delta Wetlands islands by 50%. Projected boat use at the Delta Wetlands Project islands would contribute substantially to increases in boating-related vehicle traffic on Delta roadways. With the implementation of this mitigation measure the number of projected peak season (June-August) boating-related vehicle trips under Alternative 1 would decline from 1680 to 840 trips per day. This reduction in boating-related vehicle trips would greatly reduce the magnitude of this impact. However, changes in traffic on Delta roadways would still exceed the peak-hour significance criteria.

Safety on Delta Roadways

Under Alternative 1, traffic safety on Delta roadways would be adversely affected by the addition of large, slow-moving vehicles. Large vehicle traffic generated during construction under Alternative 1 would consist of trucks carrying materials to the project sites as well as agricultural vehicle traffic associated with concurrent agricultural activities. Large vehicle traffic generated during operation of Alternative 1 would consist solely of agricultural vehicle traffic. The issue of safety on Delta roadways was assessed qualitatively for this chapter. See Table L1-2 in Appendix L1 for the number of large vehicle trips generated on each island during construction and operation of Alternative 1.

Summary of Project Impacts and Recommended Mitigation Measures

Impact L-3: Creation of Safety Conflicts on Delta Roadways during Project Construction. Implementation of Alternative 1 would slightly increase traffic during project construction (Table 3L-6). A portion of this increase would consist of large trucks transporting materials to the DW project islands. As explained above under “Criteria for Determining Impact Significance”, an alternative is considered to have a significant impact if it would result in the addition of large trucks or other equipment to Delta roadways. This criterion is quite stringent because of the great potential for safety conflicts on these roadways. Although agricultural activities would taper off from current levels throughout the construction period, under the worst-case scenario, it is assumed that all existing agricultural traffic levels would continue throughout the construction period. Therefore, because construction vehicles would be added to traffic on Delta roadways, this impact is considered significant.

Implementing Mitigation Measure L-1 would reduce Impact L-3 to a less-than-significant level.

Mitigation Measure L-1: Clearly Mark Intersections with Poor Visibility in the DW Project Vicinity. Before beginning construction at any of the DW project sites, visibility at intersections in the project vicinity shall be visually assessed. If visibility is poor at any intersection, highly visible signs shall be posted at all approaches to the intersection stating that construction activity is taking place and that drivers

should be aware of construction vehicles traveling on roads in the area.

A construction contractor and a representative of the San Joaquin County Department of Public Works shall visually assess visibility at intersections along Bacon Island Road, SR 4 from I-5 to Bacon Island Road, SR 4 from Bacon Island Road to the San Joaquin County line, and SR 12 from I-5 to the west end of Bouldin Island.

A construction contractor and a representative of the Contra Costa County Department of Public Works shall visually assess visibility at intersections along SR 4 from the Contra Costa County line to SR 160, Jersey Island Road from Cypress Road to the Jersey-Bradford-Webb ferry, Cypress Road from SR 4 to Jersey Island Road, Delta Road from SR 4 to Holland Tract Road, Holland Tract Road from Delta Road to its end, Byron Highway from SR 4 to Delta Road, and SR 12 from the west end of Bouldin Island to SR 160.

Impact L-4: Reduction in Safety Conflicts on Delta Roadways during Project Operation. Farm vehicles and trucks transporting agricultural products occasionally cause traffic congestion on Delta roadways. The congestion is most apparent when these relatively slow-moving vehicles operate on high-speed roadways. The congestion is most frequent during harvest season, when the number of farm vehicles and transport trucks operating on public roads reaches a peak. For example, in 1988, more than 400 truckloads of corn left Bouldin Island on SR 12 during the corn harvest (Wilkerson pers. comm.). Additionally, operation of these vehicles on public roadways can increase the frequency of traffic accidents.

Implementation of Alternative 1 would result in a reduction in agricultural vehicle traffic on Delta roadways during project operation (see Tables L1-1 and L1-2 in Appendix L1, "Estimated Trip Generation"). Therefore, this impact is considered beneficial.

Mitigation. No mitigation is required.

Circulation on and Access to Delta Roadways

During construction of Alternative 1, circulation on and access to Delta roadways could be adversely

affected by road closures or detours. During operation of Alternative 1, circulation and access could be adversely affected by increased peak-hour traffic volumes, as discussed above under "Level of Service on Delta Roadways". The issues of circulation on and access to Delta roadways are assessed qualitatively in this chapter.

Summary of Project Impacts and Recommended Mitigation Measures

Impact L-5: Change in Circulation on or Access to Delta Roadways during Project Construction. Because most of the construction activity would take place on the interior side of the levees, implementation of Alternative 1 would not cause traffic conflicts, detours, or lane closures during construction on the DW project islands. Therefore, this impact is considered less than significant.

Mitigation. No mitigation is required.

Impact L-6: Change in Circulation on Delta Roadways during DW Project Operation. Implementation of Alternative 1 would not involve any alterations to the existing roadway network in the project vicinity. Therefore, implementation of this alternative would not change circulation patterns on Delta roadways. This impact is considered less than significant.

Mitigation. No mitigation is required.

Waterway Traffic and Safety

Waterway Traffic and Circulation

During operation of Alternative 1, waterway traffic would increase and could adversely affect boat circulation on Delta waterways. Under Alternative 1, an estimated 560 boats would originate from the DW project recreation facilities on a peak summer day. Assuming two trips per boat, implementation of Alternative 1 would increase peak boating use by 1,116 boat trips. Bacon Island and Webb Tract would each generate 323 boat trips; Bouldin Island and Holland Tract would generate 294 and 176 boat trips, respectively (Table 3L-5). There are no current studies to document boat-trip generation for the entire Delta (Delta Protection Commission 1995). However, as

described in Chapter 3J, “Recreation and Visual Resources”, implementing Alternative 1 is projected to increase average annual boating in the Delta by 5%. Therefore, the increase in peak-day boat trips under Alternative 1 is assumed to be proportional to the estimated increase in annual boating recreation use.

Construction of new boat facilities would increase restrictions on existing boat use on waterways adjacent to the DW project islands. As described in the “Affected Environment” section, boat speeds are restricted to 5 mph within 200 yards upstream or downstream of boat docks. If all DW recreation facilities were constructed in waterways that do not have existing speed restrictions, the facilities would require restrictions on over 8 miles of Delta waterways. Restricted speeds, combined with boats moving into and out of waterways, create boat congestion on days of heavy recreation use. Therefore, implementing the DW project would contribute to boat traffic congestion adjacent to the DW project islands.

Navigation

During construction under Alternative 1, large barges loaded with rock would be transported to the DW project islands. These barges are most likely to be loaded directly from a quarry located on the water (e.g., the San Rafael rock quarry on San Pablo Bay). Additionally, a barge would be permanently moored at the DW project islands to assist offloading and placement of rock. Because of their size, barges could obstruct more than one-third the width of a channel. Therefore, use of barges would contribute to navigation and safety issues on Delta waterways during construction.

The proposed design of the recreation facilities includes a 36-berth floating boat dock and a gangway that extends 40 feet into the adjacent channels (see Appendix 2, Figures 2-7 and 2-8). To minimize effects on navigability of these waterways, DW would design and construct all floating boat docks and gangways in accordance with the recommended standards of the 1991 Department of Boating and Waterways’ Layout, Design and Construction Handbook for Small Craft Boat Launching Facilities. In compliance with Corps recommendations for boat facilities, floating boat docks would not extend more than one-third the horizontal distance across the channel and a navigation channel of not less than 100 feet would be maintained at all times.

Water discharged from the reservoir islands into adjacent channels would not adversely affect navigation in those locations. Pumps would include an expansion chamber to slow the speed of water entering the Delta channels. The cross-sectional area at the point of discharge would be 30 square feet, resulting in an exit velocity of 3.33 feet per second. By the time water has moved a few feet past the pump exit, the velocity would slow to well below scour velocity (see Chapter 3B, “Hydrodynamics”), and with a pump spacing of 25 feet and a channel water depth of approximately 12 feet, the water velocity would slow to 0.33 feet per second by the time it reaches the surface. At this speed, water entering the Delta channels would not affect navigation of even small boats on the water surface. Appendix 2 describes the pump design in more detail.

Water storage on the Delta Wetlands reservoir islands could increase fog on the project islands during the winter months but would not substantially affect existing fog conditions in the adjacent channel waters or in other parts of the Delta (Bohnak pers. comm.). Therefore, increased fog on the Delta Wetlands reservoir islands would not affect boater navigation in adjacent channels.

Safety

Implementation of Alternative 1 would adversely affect boating safety on Delta waterways by increasing boat traffic, contributing to congestion, and adversely affecting navigation during project construction. The introduction of more boats to waterways surrounding the DW project islands would increase the potential for accidents. As described above, excessive speeds, large wakes, boaters with limited knowledge and experience, and a lack of uniformity in signs regulating boat speeds and other boating information contribute to safety problems on Delta waterways. As shown in Figure 3L-2, areas most prone to accidents include Little Potato Slough near Terminous, the southern end of Holland Tract near Palm Tract, areas along the southern portion of Bacon Island, and areas in the vicinity of Franks Tract along the Piper Slough.

Summary of Project Impacts and Recommended Mitigation Measures

Impact L-7: Increase in Boat Traffic and Congestion on Delta Waterways during DW

Project Operation. Implementation of Alternative 1 would result in the addition of 1,116 boat trips on a peak summer day to waterways in the DW project vicinity. Based on estimated recreation use, it is estimated that boat trips would increase by approximately 5% over existing conditions. Also, construction of the recreation facilities would restrict boat speeds on up to approximately 8 miles of Delta waterways. Restricted speeds, combined with boats moving into and out of waterways at the DW facilities, would create boat congestion on days of heavy recreational use. Therefore, this impact is considered significant and unavoidable.

Implementation of Mitigation Measure RJ-1 would reduce impact L-7, but not to a less-than-significant level.

Mitigation Measure RJ-1: Reduce the Number of Outward Boat Slips Located at Recreation Facilities. Delta Wetlands shall reduce the total number of outward (channel-side) boat slips proposed on the Delta Wetlands islands by 50%. Implementation of this mitigation measure would reduce the projected number of peak season (June-August) boat trips under Alternative 1 from 1116 to 560 trips per day. Therefore, adverse impacts on boat traffic and congestion that would result from project implementation would be greatly reduced. However, increased boat traffic is still considered significant with implementation of this mitigation measure.

Impact L-8: Change in Navigation Conditions on Delta Waterways Surrounding the DW Project Islands during Project Operation. Implementation of Alternative 1 would result in the construction of recreation facilities with floating boat docks and gangways that would extend into the channels. However, the floating boat docks and gangways would not extend more than one-third the horizontal distance across the channel and a navigation channel of not less than 100 feet would be maintained at all times. Additionally, the boat docks and gangways would be constructed in accordance with recommended standards of the 1991 Department of Boating and Waterways' Layout, Design and Construction Handbook for Small Craft Boat Launching Facilities. Therefore, this impact is considered less than significant.

Mitigation. No mitigation is required.

Impact L-9: Creation of Safety Conflicts on Delta Waterways during Project Construction.

Implementation of Alternative 1 would result in a barge being permanently moored at the DW project island where construction is occurring. This barge would have a crane on it and would be moored using long pilings that fit through openings in the base of the barge and are sunk into the riverbed (Stewart pers. comm.). Tugboats would transport barges loaded with rock to the permanently moored barge for offloading and placement. Because of its size and the length of time that would be located in adjacent channels, the barge is considered an obstruction and is a cause for safety concerns during construction. Therefore, this impact is considered significant.

Implementing Mitigation Measure L-2 would reduce Impact L-9 to a less-than-significant level.

Mitigation Measure L-2: Clearly Mark the Barge and Notify the U.S. Coast Guard of Construction Activities. The construction contractor shall ensure that the barge is well marked and lit in accordance with Title 14 of the California Code of Regulations, Section 7000 *et seq.* Additionally, the construction contractor shall contact the U.S. Coast Guard 2 weeks before construction begins so that a notice to mariners may be issued by the U.S. Coast Guard alerting boaters to the presence of the barge and to construction activities occurring in the area. The contractor must inform the Coast Guard of the location and type of activity, whether night operations will be taking place, and whether there will be lights and buoys (Pisel pers. comm.). These safety measures are common practice for contractors performing work in marine environments (Stewart pers. comm.).

Impact L-10: Increase in the Potential for Safety Problem on Waterways Surrounding the DW Project Islands. Implementation of Alternative 1 would adversely affect boating safety on Delta waterways by increasing boat traffic, contributing to congestion, and adversely affecting navigation during project construction. Therefore, this impact is considered significant.

Implementing Mitigation Measure L-3 would reduce Impact L-10 to a less-than-significant level.

Mitigation Measure L-3: Clearly Post Waterway Intersections, Speed Zones, and Potential Hazards in the DW Project Vicinity. Prior to operation of the DW recreation facilities, intersections shall be assessed for speed requirements, poor visibility, and any unposted areas or potential hazards

with respect to boating. If poor visibility conditions or any potential boating hazards exist, these areas shall be marked with buoys, waterway markers, and information signs in accordance with the California uniform waterway marking system or federal lateral waterway system. Speed requirements shall be posted and enforced in accordance with local and state laws and ordinances. Regulations for boating activities proposed by local agencies must be submitted to, reviewed, and approved by the California Department of Boating and Waterways in accordance with the California Harbors and Navigation Code before they are adopted and implemented.

Air Traffic from Bouldin Island

Under Alternative 1, the Bouldin Island airstrip would be available for maintenance and recreational activity on the DW project islands. Hunters and other recreationists could fly to the island, and DW would use the airstrip for habitat maintenance (e.g., seed dispersal and application of herbicide and pesticide). The HMP places restrictions on timing and frequency of takeoffs and landings from the airstrip during the waterfowl season (September 1 to March 31) to reduce disturbances to wildlife (see Appendix G3, "Habitat Management Plan for the Delta Wetlands Habitat Islands"). During other times of the year, no restrictions would be placed on use of the airstrip. However, DW anticipates that the use of the airstrip would average up to 300 takeoffs and landings throughout the rest of the year, with approximately 50% of those flights occurring during summer. Combined with the limit of 100 takeoffs and landings during the hunt season, the number of flights generated from the airstrip under Alternative 1 would be less than current levels for agricultural activities. Although the season of peak airstrip use may change from existing conditions, implementing the DW project would not substantially change operation of the airstrip. Therefore, no adverse effects on existing air traffic would occur.

IMPACTS AND MITIGATION MEASURES OF ALTERNATIVE 2

The impacts and mitigation measures of Alternative 2 are the same as those described for Alternative 1.

IMPACTS AND MITIGATION MEASURES OF ALTERNATIVE 3

Alternative 3 involves storage of water on Bacon Island, Webb Tract, Bouldin Island, and Holland Tract, with secondary uses for wildlife habitat and recreation. The portion of Bouldin Island north of SR 12 would be managed as a wildlife habitat area and would not be used for water storage. The Bouldin Island airstrip would not be operated under this alternative.

The peak-hour volumes for some roadways under Alternative 3 vary slightly from those estimated for Alternative 1. These variations would not affect LOS for any roadway. Impacts and mitigation measures relating to roadway safety, circulation and access, and waterway traffic and safety under this alternative are the same as under Alternative 1.

Level of Service on Delta Roadways

Traffic sources during construction and operation of Alternative 3 would be the same as those described for Alternative 1. Trip generation under Alternative 3 was estimated in the same manner and using the same assumptions as trip generation under Alternative 1.

Bacon Island

Construction. As shown in Table 3L-6, the estimated peak-hour volume on Bacon Island Road at the Bacon Island bridge during construction under Alternative 3 is 241 and under future without-project conditions is 234. As shown in Table 3L-7, the LOS on this roadway segment would be A under future without-project conditions and during construction under Alternative 3.

As shown in Table 3L-6, the estimated peak-hour volume on SR 4 east of Tracy Boulevard during construction under Alternative 3 is 1,114 and under future without-project conditions is 1,100. As shown in Table 3L-7, the LOS on this roadway segment would be D under future without-project conditions and during construction under Alternative 3.

Operation. As shown in Table 3L-6, the estimated peak-hour volume on Bacon Island Road at

the Bacon Island bridge during operation of Alternative 3 is 290 and under future without-project conditions is 234. As shown in Table 3L-7, the LOS on this roadway segment would be A under future conditions with and without Alternative 3.

As shown in Table 3L-6, the estimated peak-hour volume on SR 4 east of Tracy Boulevard during operation of Alternative 3 is 1,177 and under future without-project conditions is 1,100. As shown in Table 3L-7, the LOS on this roadway segment would be D under future conditions with and without Alternative 3.

Webb Tract

Construction. As shown in Table 3L-6, the estimated peak-hour volume on SR 4 south of Cypress Road during construction under Alternative 3 is 2,746 and under future without-project conditions is 2,732. As shown in Table 3L-7, the LOS on this roadway segment would be E under future without-project conditions and during construction under Alternative 3.

Operation. As shown in Table 3L-6, the estimated peak-hour volume on SR 4 south of Cypress Road during operation of Alternative 3 is 2,809 and under future without-project conditions is 2,732. As shown in Table 3L-7, the LOS on this roadway segment would be E under future without-project conditions and F under Alternative 3 conditions.

Bouldin Island

Construction. As shown in Table 3L-6, the estimated peak-hour volume on SR 12 west of Terminous during construction under Alternative 3 is 2,916 and under future without-project conditions is 2,900. As shown in Table 3L-7, the LOS on this roadway segment would be F under future without-project conditions and during construction under Alternative 3.

Operation. As shown in Table 3L-6, the estimated peak-hour volume on SR 12 west of Terminous during operation of Alternative 3 is 2,950 and under future without-project conditions is 2,900. As shown in Table 3L-7, the LOS on this roadway segment would be F under future conditions with and without Alternative 3.

Holland Tract

Construction. As shown in Table 3L-6, the estimated peak-hour volume on SR 4 south of Delta Road during construction under Alternative 3 is 2,852 and under future without-project conditions is 2,838. As shown in Table 3L-7, the LOS on this roadway segment would be F under future without-project conditions and during construction under Alternative 3.

Operation. As shown in Table 3L-6, the estimated peak-hour volume on SR 4 south of Delta Road during operation of Alternative 3 is 2,915 and under future without-project conditions is 2,838. As shown in Table 3L-7, the LOS on this roadway segment would be F under future conditions with and without Alternative 3.

Summary of Project Impacts and Recommended Mitigation Measures

Impact L-11: Increase in Traffic on Delta Roadways during Project Construction. Implementation of Alternative 3 would slightly increase peak-hour volumes during project construction. However, the increase in volume would be less than 25 trips on all roadways analyzed. Furthermore, the LOS letter grade would not be affected on any of the roadways analyzed. Therefore, this impact is considered less than significant.

Mitigation. No mitigation is required.

Impact L-12: Increase in Traffic on Delta Roadways during Project Operation. Implementation of Alternative 3 would increase peak-hour volumes during project operation. As shown in Table L1-2 in Appendix L1, summer recreationists would generate the majority of the vehicle trips estimated for Alternative 3. The increase in peak-hour volume would be more than 25 trips on all roadways analyzed. Of these roadways, two have unacceptable LOS under future without-project conditions, including SR 12 west of Terminous and SR 4 south of Delta Road (see Table 3L-7). Therefore, implementation of Alternative 3 would result in the addition of more than 25 peak-hour trips to roadway segments with already unacceptable LOS under future without-project conditions. Additionally, LOS would be reduced by a letter grade, from E to F, on SR 4 south of Cypress Road and from A to B on Jersey Island Road north of

Dutch Slough Road. This impact is considered significant and unavoidable.

Implementation of Mitigation Measure RJ-1 would reduce impact L-12, but not to a less-than-significant level.

Mitigation Measure RJ-1: Reduce the Number of Outward Boat Slips Located at Recreation Facilities. Delta Wetlands shall reduce the total number of outward (channel-side) boat slips proposed on the Delta Wetlands islands by 50%. Projected boat use at the Delta Wetlands Project islands would contribute substantially to increases in boating-related vehicle traffic on Delta roadways. With the implementation of this mitigation measure the number of projected peak season (June-August) boating-related vehicle trips under Alternative 3 would decline from 1765 to 882 trips per day. This reduction in boating-related vehicle trips would greatly reduce the magnitude of this impact. However, changes in traffic on Delta roadways would still exceed the peak-hour significance criteria.

Safety on Delta Roadways

The roadway safety impacts and mitigation measures of Alternative 3 are the same as those described for Alternative 1.

Summary of Project Impacts and Recommended Mitigation Measures

Impact L-13: Creation of Safety Conflicts on Delta Roadways during Project Construction. This impact is described above under Impact L-3. This impact is considered significant. Implementing Mitigation Measure L-1 would reduce Impact L-10 to a less-than-significant level.

Mitigation Measure L-1: Clearly Mark Intersections with Poor Visibility in the DW Project Vicinity. This mitigation measure is described above under "Impacts and Mitigation Measures of Alternative 1".

Impact L-14: Reduction in Safety Conflicts on Delta Roadways during Project Operation. This impact is described above under Impact L-4. This impact is considered beneficial.

Mitigation. No mitigation is required.

Circulation on and Access to Delta Roadways

The circulation impacts and mitigation measures of Alternative 3 are the same as those described for Alternative 1.

Summary of Project Impacts and Recommended Mitigation Measures

Impact L-15: Change in Circulation on or Access to Delta Roadways during Project Construction. This impact is described above under Impact L-5. This impact is considered less than significant.

Mitigation. No mitigation is required.

Impact L-16: Change in Circulation on Delta Roadways during Project Operation. This impact is described above under Impact L-6. This impact is considered less than significant.

Mitigation. No mitigation is required.

Waterway Traffic and Safety

The waterway traffic and safety impacts and mitigation measures of Alternative 3 are the same as those described for Alternative 1.

Summary of Project Impacts and Recommended Mitigation Measures

Impact L-17: Increase in Boat Traffic and Congestion on Delta Waterways during DW Project Operation. Implementation of Alternative 3 would result in addition of 1,175 boat trips on a peak summer day to waterways in the DW project vicinity. This impact is described above under Impact L-7 and is considered significant and unavoidable.

Implementation of Mitigation Measure RJ-1 would reduce impact L-17, but not to a less-than-significant level.

Mitigation Measure RJ-1: Reduce the Number of Outward Boat Slips Located at Recreation Facilities. Delta Wetlands shall reduce the total number of outward (channel-side) boat slips proposed on the Delta Wetlands islands by 50%. Implementation of this mitigation measure would reduce the projected number of peak season (June-August) boat trips under Alternative 3 from 1175 to 590 trips per day. Therefore, adverse impacts on boat traffic and congestion that would result from project implementation would be greatly reduced. However, increased boat traffic is still considered significant.

Impact L-18: Change in Navigation Conditions on Delta Waterways Surrounding the DW Project Islands during Project Operation. This impact is described above under Impact L-8. This impact is considered less than significant.

Mitigation. No mitigation is required.

Impact L-19: Creation of Safety Conflicts on Delta Waterways during Project Construction. This impact is described above under Impact L-9. This impact is considered significant. Implementing Mitigation Measure L-2 would reduce Impact L-19 to a less-than-significant level.

Mitigation Measure L-2: Clearly Mark the Barge and Notify the U.S. Coast Guard of Construction Activities. This mitigation measure is described above under “Impacts and Mitigation Measures of Alternative 1”.

Impact L-20: Increase in the Potential for Safety Problem on Waterways Surrounding the DW Project Islands. This impact is described above under Impact L-10. This impact is considered significant. Implementing Mitigation Measure L-3 would reduce Impact L-20 to a less-than-significant level.

Mitigation. L-3: Clearly Post Waterway Intersections, Speed Zones, and Potential Hazards in the DW Project Vicinity. This mitigation measure is described above under “Impacts and Mitigation Measures of Alternative 1”.

IMPACTS AND MITIGATION MEASURES OF THE NO-PROJECT ALTERNATIVE

Operation of the No-Project Alternative consists of intensified agricultural activity with some increase in recreational use compared with existing conditions. Because implementation of the No-Project Alternative would not include development of recreation facilities and boat docks and would not require construction activities, traffic and safety on Delta waterways would not change from existing conditions. Therefore, waterway traffic and safety are not discussed for the No-Project Alternative.

The project applicant would not be required to implement mitigation measures if the No-Project Alternative were selected by the lead agencies. However, mitigation measures are presented for impacts of the No-Project Alternative to provide information to the reviewing agencies regarding the measures that would reduce impacts if the project applicant implemented a project that required no federal or state agency approvals. This information would allow the reviewing agencies to make a more realistic comparison of DW project alternatives, including implementation of recommended mitigation measures, with the No-Project Alternative.

Level of Service on Delta Roadways

Traffic sources during operation of the No-Project Alternative would include increased agricultural and recreational activity compared with future without-project conditions. Trip generation under the No-Project Alternative was estimated in the same manner and using the same assumptions as trip generation under Alternative 1.

Bacon Island

As shown in Table 3L-6, the estimated peak-hour volume on Bacon Island Road at the Bacon Island bridge during operation of the No-Project Alternative is 257 and under future without-project conditions is 234. As shown in Table 3L-7, the LOS on this roadway segment would be A under future conditions with and without the No-Project Alternative.

As shown in Table 3L-6, the estimated peak-hour volume on SR 4 east of Tracy Boulevard during operation of the No-Project Alternative is 1,127 and under future without-project conditions is 1,100. As shown in Table 3L-7, the LOS on this roadway segment would be C/D under future conditions with and without the No-Project Alternative.

Webb Tract

As shown in Table 3L-6, the estimated peak-hour volume on SR 4 south of Cypress Road during operation of the No-Project Alternative is 2,759 and under future without-project conditions is 2,732. As shown in Table 3L-7, the LOS on this roadway segment would be E under future conditions with and without the No-Project Alternative.

Bouldin Island

As shown in Table 3L-6, the estimated peak-hour volume on SR 12 west of Terminous during operation of the No-Project Alternative is 2,920 and under future without-project conditions is 2,900. As shown in Table 3L-7, the LOS on this roadway segment would be F under future conditions with and without the No-Project Alternative.

Holland Tract

As shown in Table 3L-6, the estimated peak-hour volume on SR 4 south of Delta Road during operation of the No-Project Alternative is 2,865 and under future without-project conditions is 2,838. As shown in Table 3L-7, the LOS on this roadway segment would be F under future conditions with and without the No-Project Alternative.

Summary of Project Impacts and Recommended Mitigation Measures

Increase in Traffic on Delta Roadways. Implementation of the No-Project Alternative would increase peak-hour volumes during project operation. As shown in Table L1-2, the majority of trips generated by Alternative 1 are recreation related. The increase in peak-hour volume would be slightly more than 25 trips on three of the roadways analyzed: SR 4 east of Tracy Boulevard, SR 4 south of Cypress Road, and SR 4

south of Delta Road. Of these roadways, only SR 4 south of Delta Road has an unacceptable LOS under future without-project conditions (see Table 3L-7). Therefore, implementation of the No-Project Alternative would result in the addition of more than 25 peak-hour trips to a roadway segment with an already unacceptable LOS under future without-project conditions. However, LOS would not be reduced by a letter grade on any roadway.

Safety on Delta Roadways

Under the No-Project Alternative, traffic safety on Delta roadways would be adversely affected by the addition of agricultural vehicle traffic, which tends to be large and slow moving. See Table L1-2 in Appendix L1 for the number of agricultural vehicle trips expected to be generated on each island during operations under the No-Project Alternative. The issue of safety on Delta roadways is assessed qualitatively in this chapter.

Summary of Project Impacts and Recommended Mitigation Measures

Creation of Safety Conflicts on Delta Roadways. Implementation of the No-Project Alternative would result in an increase in agricultural vehicle traffic on Delta roadways (see Tables L1-1 and L1-3 in Appendix L1, “Estimated Trip Generation”). Implementing the following measure would reduce this effect of the No-Project Alternative.

Clearly Mark Intersections with Poor Visibility in the Vicinity of Agricultural Operations. Visibility at intersections in the vicinity of intensified agricultural operations shall be assessed. If visibility is poor at any intersection, highly visible signs shall be posted at all approaches to the intersection stating that drivers should be aware of agricultural vehicles traveling on roads in the area.

A representative of the San Joaquin County Department of Public Works should assess visibility at intersections along Bacon Island Road, SR 4 from I-5 to Bacon Island Road, SR 4 from Bacon Island Road to the San Joaquin County line, and SR 12 from I-5 to the west end of Bouldin Island.

A representative of the Contra Costa County Department of Public Works should assess visibility at intersections along SR 4 from the Contra Costa County line to SR 160, Jersey Island Road from Cypress Road to the Jersey-Bradford-Webb ferry, Cypress Road from SR 4 to Jersey Island Road, Delta Road from SR 4 to Holland Tract Road, Holland Tract Road from Delta Road to its end, Byron Highway from SR 4 to Delta Road, and SR 12 from the west end of Bouldin Island to SR 160.

Circulation on and Access to Delta Roadways

Circulation on and access to Delta roadways could be adversely affected by increased agricultural traffic volumes under the No-Project Alternative. See Table L1-2 in Appendix L1 for the number of agricultural vehicle trips generated on each island during operations under the No-Project Alternative. The issues of circulation on and access to Delta roadways are assessed qualitatively in this chapter.

Summary of Project Impacts and Recommended Mitigation Measures

Decrease in Circulation on Delta Roadways. Implementation of the No-Project Alternative would slightly affect peak-hour volumes on Delta roadways. Although the overall number of trips added to Delta roadways is small, many of these trips would be made by agricultural vehicles, which tend to be large and slow moving. Therefore, it is possible that implementation of this alternative could negatively affect circulation on Delta roadways, although access to project islands is not expected to be affected. Implementing the following measure would reduce this effect of the No-Project Alternative.

Restrict Agricultural Vehicle Operators from Using Delta Highways during Peak Hours. Drivers of agricultural vehicles associated with agricultural activities on the DW islands operating at speeds lower than the posted speed limit on Delta highways should be restricted from using Delta highways during peak hours, from approximately 7:00 a.m. to 9:00 a.m. and 4:00 p.m. to 6:00 p.m. on weekdays.

CUMULATIVE IMPACTS

Cumulative impacts are defined as the impacts of all reasonably foreseeable future projects; this means that all traffic growth occurring between the present and a future period is included in the impact assessment. Cumulative traffic growth is represented by the change in traffic levels from existing conditions to future with-project conditions. This is different from the previous assessment of “direct” impacts (construction- and operation-related impacts of the DW project alternatives), which was based on a comparison between future without-project and future with-project conditions.

For the cumulative impact assessment, future with-project traffic volumes and LOS were compared with existing traffic volumes and LOS. The increment of growth in traffic volumes from existing conditions to future without-project volumes represents the contribution of all reasonably foreseeable future projects, whereas the increment of growth from future without-project volumes to future with-project volumes represents only the contribution of the project. Future traffic conditions are based on information from Caltrans district and county transportation planners and engineers.

In the assessment of direct impacts of the DW project alternatives, congestion and circulation were addressed separately. Under cumulative conditions, including operation of any DW project alternative, traffic volumes would increase and assessment of circulation problems would be encompassed by the analysis of congestion. Therefore, there is no separate assessment of circulation in the cumulative impact analysis. Furthermore, safety on Delta waterways during construction is not an issue because construction is not assessed as part of cumulative conditions. As in the direct impact analysis, although agricultural and recreation-related traffic would not be present during the same months, all sources of traffic were combined to make the cumulative impact analysis a worst-case analysis.

Cumulative Impacts, Including Impacts of Alternative 1

Level of Service on Delta Roadways

Bacon Island. As shown in Table 3L-6, the estimated peak-hour volume on SR 4 east of Tracy Boulevard during operation of Alternative 1 is 1,109. As shown in Table 3L-2, the peak-hour volume under existing conditions is 725.

As shown in Table 3L-7, the LOS on this roadway segment would be D under Alternative 1. As shown in Table 3L-3, existing LOS on this segment is C.

Webb Tract. As shown in Table 3L-6, the estimated peak-hour volume on SR 4 south of Cypress Road during operation of Alternative 1 is 2,741. As shown in Table 3L-2, the peak-hour volume on SR 4 south of Cypress Road under existing conditions is 1,400.

As shown in Table 3L-7, the LOS on this roadway segment would be E under Alternative 1. As shown in Table 3L-3, existing LOS on this segment is D.

Bouldin Island. As shown in Table 3L-6, the estimated peak-hour volume on SR 12 west of Terminous during operation of Alternative 1 is 2,949. As shown in Table 3L-2, the peak-hour volume on SR 12 west of Terminous under existing conditions is 1,300.

As shown in Table 3L-7, the LOS on this roadway segment would be F under Alternative 1. As shown in Table 3L-3, existing LOS on this segment is D.

Holland Tract. As shown in Table 3L-6, the estimated peak-hour volume on SR 4 south of Delta Road during operation of Alternative 1 is 2,909. As shown in Table 3L-2, the peak-hour volume on SR 4 south of Delta Road under existing conditions is 1,600.

As shown in Table 3L-7, the LOS on this roadway segment would be F under Alternative 1. As shown in Table 3L-3, existing LOS on this segment is D.

Impact L-21: Increase in Traffic on Delta Roadways during Operation of Future Projects, Including the DW Project. Peak-hour volumes would increase during operation of future projects, including Alternative 1. The increase in volumes would be enough to degrade LOS on each of the roadways

analyzed. Alternative 1 would contribute approximately 3% of the cumulative traffic increase on SR 4 east of Tracy Boulevard and approximately 1% of the cumulative traffic increases on the other roadways.

On three of the segments, SR 4 south of Cypress Road, SR 12 west of Terminous, and SR 4 south of Delta Road, LOS is reduced by at least one full letter grade. Therefore, this impact is considered significant.

Implementing Mitigation Measures L-4 and RJ-1 would reduce Impact L-21 to a less-than-significant level.

Mitigation Measure L-4: Implement Caltrans' Route Concepts for SR 4 and SR 12. Caltrans' route concepts for SR 12 across Bouldin Island and SR 4 in Contra Costa County are for four-lane highways in 2010 (Cowell and Johnson pers. comms.). This widening would include the sections of SR 4 south of Cypress Road and south of Delta Road and SR 12 west of Terminous. Caltrans has initiated preliminary design and environmental compliance work for the widening of SR 12 on Bouldin Island (O'Conner pers. comm.). The portion of SR 4 between the San Joaquin County line and I-5 would remain a two-lane highway because of the narrow bridges along that portion of the route. Table 3L-8 describes improvements in V/C ratio and LOS that would result from implementation of Caltrans' route concepts.

Mitigation Measure RJ-1: Reduce the Number of Outward Boat Slips Located at Recreation Facilities. This mitigation measure is described above under "Impacts and Mitigation for Alternative 1".

Safety on Delta Roadways

Impact L-22: Reduction in Safety Conflicts on Delta Roadways during Operation of Future Projects, Including the DW Project. Operation of reasonably foreseeable future projects, including Alternative 1, would result in a reduction in agricultural vehicle traffic on Delta roadways compared with existing conditions (Tables L1-1 and L1-2 in Appendix L1, "Estimated Trip Generation"). Therefore, this impact is considered beneficial.

Mitigation. No mitigation is required.

Waterway Traffic and Safety

Impact L-23: Cumulative Increase in Safety Problems on Delta Waterways. Speeding, unsafe vessel operation, lack of proper safety equipment (life jackets), and alcohol-related incidents continue to be major problems on Delta waterways. Additionally, recent cutbacks in funding for marine patrol services provided by the five Delta counties have limited enforcement of safety regulations in the Delta (Delta Protection Commission 1995). Implementation of Alternative 1, combined with increasing recreational use of the Delta by residents of growing regional population centers and limited resources for safety improvements in the Delta, could adversely affect boating safety on Delta waterways. This impact is considered significant and unavoidable.

Implementing Mitigation Measures L-5 and RJ-1 would reduce this impact, but not to a less-than-significant level.

Mitigation Measure L-5: Develop and Enforce a Boater Safety Program for DW Private Boat Users. Working with the Coast Guard and local government marine patrols, DW should develop and enforce boater safety rules for private boat users on the DW project islands. These rules could include requiring that all boaters attend a boater education and safety course, restricting open alcohol containers from the boat docks, and rigidly enforcing boat speed restrictions near the DW recreation facilities. To support this program, DW should sponsor boater education and safety courses for private boaters and post all safety rules.

Mitigation Measure RJ-1: Reduce the Number of Outward Boat Slips Located at Recreation Facilities. This mitigation measure is described above under "Impacts and Mitigation for Alternative 1".

Cumulative Impacts, Including Impacts of Alternative 2

Although there may be a slight variation in traffic estimates for Alternatives 1 and 2, cumulative impacts of future projects including Alternative 2 would be the same as cumulative impacts of future projects including Alternative 1.

Cumulative Impacts, Including Impacts of Alternative 3

The methods and rationale used to assess cumulative impacts of future projects including Alternative 3 are the same as those used to assess cumulative impacts of future projects including Alternative 1.

Level of Service on Delta Roadways

Bacon Island. As shown in Table 3L-6, the estimated peak-hour volume on SR 4 east of Tracy Boulevard during operation of Alternative 3 is 1,177. As shown in Table 3L-2, the peak-hour volume on SR 4 east of Tracy Boulevard under existing conditions is 725.

As shown in Table 3L-7, the LOS on this roadway segment would be D under Alternative 3 conditions. As shown in Table 3L-3, existing LOS on this segment is C.

Webb Tract. As shown in Table 3L-6, the estimated peak-hour volume on SR 4 south of Cypress Road during operation of Alternative 3 is 2,909. As shown in Table 3L-2, the peak-hour volume on SR 4 south of Cypress Road under existing conditions is 1,400.

As shown in Table 3L-7, the LOS on this roadway segment would be F under Alternative 3 conditions. As shown in Table 3L-3, existing LOS on this segment is D.

Bouldin Island. As shown in Table 3L-6, the estimated peak-hour volume on SR 12 west of Terminous during operation of Alternative 3 is 2,950. As shown in Table 3L-2, the peak-hour volume on SR 12 west of Terminous under existing conditions is 1,300.

As shown in Table 3L-7, the LOS on this roadway segment would be F under Alternative 3 conditions. As shown in Table 3L-3, existing LOS on this segment is D.

Holland Tract. As shown in Table 3L-6, the estimated peak-hour volume on SR 4 south of Delta Road during operation of Alternative 3 is 2,915. As

shown in Table 3L-2, the peak-hour volume on SR 4 south of Delta Road under existing conditions is 1,600.

As shown in Table 3L-7, the LOS on this roadway segment would be F under Alternative 3 conditions. As shown in Table 3L-3, existing LOS on this segment is D.

Summary of Increase in Traffic. Peak-hour volumes would increase during operation of reasonably foreseeable future projects, including Alternative 3. The increase in volumes is enough to degrade LOS on each of the roadways analyzed. Alternative 3 would contribute 3% of the traffic increase on SR 4 east of Tracy, 1% of the traffic increase on SR 4 south of Cypress Road, 0.5% of the traffic increase on SR 12 west of Terminous, and 1% of the traffic increase on SR 4 south of Delta Road.

On four of the segments, SR 4 east of Tracy Boulevard, SR 4 south of Cypress Road, SR 12 west of Terminous, and SR 4 south of Delta Road, LOS is reduced by at least one letter grade.

The cumulative impact on level of service under Alternative 3 would be the same as under Alternative 1. The same mitigation measures would apply (but would not reduce the impact to a less-than-significant level).

Safety on Delta Roadways

The cumulative impact on Delta roadway safety under Alternative 3 would be the same as under Alternative 1.

Waterway Traffic and Safety

The cumulative impact on waterway traffic and safety under Alternative 3 would be the same as under Alternative 1.

Cumulative Impacts, Including Impacts of the No-Project Alternative

The methods and rationale used to assess cumulative effects of future projects including the No-Project Alternative are the same as those used to assess cumulative impacts of future projects including Alternative 1.

Level of Service on Delta Roadways

Bacon Island. As shown in Table 3L-6, the estimated peak-hour volume on SR 4 east of Tracy Boulevard during operation of the No-Project Alternative is 1,127. As shown in Table 3L-2, the peak-hour volume on SR 4 east of Tracy Boulevard under existing conditions is 725.

As shown in Table 3L-7, the LOS on this roadway segment would be D under the No-Project Alternative. As shown in Table 3L-3, existing LOS on this segment is C.

Webb Tract. As shown in Table 3L-6, the estimated peak-hour volume on SR 4 south of Cypress Road during operation of the No-Project Alternative is 2,759. As shown in Table 3L-2, the peak-hour volume on SR 4 south of Cypress Road under existing conditions is 1,400.

As shown in Table 3L-7, the LOS on this roadway segment would be E under the No-Project Alternative. As shown in Table 3L-3, existing LOS on this segment is D.

Bouldin Island. As shown in Table 3L-6, the estimated peak-hour volume on SR 12 west of Terminous during operation of the No-Project Alternative is 2,920. As shown in Table 3L-2, the peak-hour volume on SR 12 west of Terminous under existing conditions is 1,300.

As shown in Table 3L-7, the LOS on this roadway segment would be F under the No-Project Alternative. As shown in Table 3L-3, existing LOS on this segment is D.

Holland Tract. As shown in Table 3L-6, the estimated peak-hour volume on SR 4 south of Delta Road during operation of the No-Project Alternative is 2,865. As shown in Table 3L-2, the peak-hour volume on SR 4 south of Delta Road under existing conditions is 1,600.

As shown in Table 3L-7, the LOS on this roadway segment would be F under the No-Project Alternative. As shown in Table 3L-3, existing LOS on this segment is D.

Increase in Traffic on Delta Roadways during Operation of Future Projects, Including the No-Project Alternative. Peak-hour volumes would

increase during operation of reasonably foreseeable future projects, including the No-Project Alternative. The increase in volumes is enough to degrade LOS on each of the roadways analyzed. The No-Project Alternative would contribute 5% of the traffic increase on SR 4 east of Tracy, 1.5% of the traffic increase on SR 4 south of Cypress Road, 1% of the traffic increase on SR 12 west of Terminous, and 2% of the traffic increase on SR 4 south of Delta Road.

On four of the segments, SR 4 east of Tracy Boulevard, SR 4 south of Cypress Road, SR 12 west of Terminous, and SR 4 south of Delta Road, LOS would be reduced by at least one letter grade.

Implementing the following measure would reduce this effect of the No-Project Alternative. As described above, however, funding does not exist for implementation of this measure.

Implement Caltrans' Route Concepts for SR 4 and SR 12. This measure is described above under Mitigation Measure L-4.

Safety on Delta Roadways

Creation of Safety Conflicts on Delta Roadways during Operation of Future Projects, Including the No-Project Alternative. Operation of reasonably foreseeable future projects, including the No-Project Alternative, would cause an increase in agricultural vehicle traffic on Delta roadways during operation, compared with existing conditions (Tables L1-1 and L1-2 in Appendix L1, "Estimated Trip Generation"). Implementing the following measure would reduce this effect of the No-Project Alternative.

Clearly Mark Intersections with Poor Visibility in the Vicinity of Agricultural Operations. This measure is described above under "Impacts and Mitigation Measures of the No-Project Alternative".

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Table 3L-1. Level of Service Criteria for General Two-Lane Highway Segments (Volume-to-Capacity Ratio)

LOS	Percentage Time Delay	Average Speed (mph) ^a	Volume-to-Capacity Ratio ^b by Percentage of Roadway with No-Passing Zones					
			0%	20%	40%	60%	80%	100%
Level Terrain								
A	≤ 30	≥ 58	0.15	0.12	0.09	0.07	0.05	0.04
B	≤ 45	≥ 55	0.27	0.24	0.21	0.19	0.17	0.16
C	≤ 60	≥ 52	0.43	0.39	0.36	0.34	0.33	0.32
D	≤ 75	≥ 50	0.64	0.62	0.60	0.59	0.58	0.57
E	> 75	> 45	1.00	1.00	1.00	1.00	1.00	1.00
F			>1.00	>1.00	>1.00	>1.00	>1.00	>1.00
Rolling Terrain								
A	≤ 30	≥ 57	0.15	0.10	0.07	0.05	0.04	0.03
B	≤ 45	≥ 54	0.26	0.23	0.19	0.17	0.15	0.13
C	≤ 60	≥ 52	0.42	0.39	0.35	0.32	0.30	0.28
D	≤ 75	≥ 49	0.62	0.57	0.52	0.48	0.46	0.43
E	> 75	> 40	0.97	0.94	0.92	0.91	0.90	0.90
F			>0.97	>0.94	>0.92	>0.91	>0.90	>0.90
Mountainous Terrain								
A	≤ 30	≥ 56	0.14	0.09	0.07	0.04	0.02	0.01
B	≤ 45	≥ 54	0.25	0.20	0.16	0.13	0.12	0.10
C	≤ 60	≥ 49	0.39	0.33	0.28	0.23	0.20	0.16
D	≤ 75	≥ 45	0.58	0.50	0.45	0.40	0.37	0.33
E	> 75	> 35	0.91	0.87	0.84	0.82	0.80	0.78
F			>0.91	>0.87	>0.84	>0.82	>0.80	>0.78

Notes: LOS A: Represents unrestricted operation.
LOS B: Generally may be described as smooth and stable.
LOS C: Although still stable, approaches the range where instability can occur because of small changes in traffic flow.
LOS D: Vehicles must frequently change speeds to avoid conflicts.
LOS E: Represents capacity operation; considerable delay is experienced and speeds are greatly reduced.
LOS F: Represents over-capacity flows with heavy congestion and considerable reductions in speed.

Table 3L-1. Continued

^a Average travel speed of all vehicles for highways with design speed \geq 60 mph; for highways with lower design speeds, reduce speed by 4 mph for each 10-mph reduction in design speed below 60 mph; assumes that speed is not restricted to lower values by regulation.

^b Ratio of flow rate to an ideal capacity of 2,800 passenger cars per hour in both directions.

Source: Transportation Research Board 1985.

Table 3L-2. Existing Traffic Volumes on Roadways in the Project Vicinity

Location	Average Daily Traffic	Peak-Hour Volume
Bacon Island		
Bacon Island Road at the Bacon Island Road bridge	550	55
Lower Jones Road north of Cook Road	300	30
SR 4 east of Tracy Boulevard	5,900	725
Webb Tract		
Jersey Island Road north of Dutch Slough Road	200	20
Cypress Road west of Jersey Island Road	6,917	591
SR 4 south of Cypress Road	11,800	1,400
Bouldin Island		
SR 12 west of Terminous	12,200	1,300
Holland Tract		
Delta Road east of Byron Highway	537	60
SR 4 south of Delta Road	13,000	1,600

Note: These are actual volumes supplied by the sources listed below.

Sources: Caltrans 1988; Chalk, Redic, and Chahal pers. comms.

Table 3L-3. Existing Levels of Service on Major Roadway Segments in the Project Vicinity

Location	Volume-to-Capacity Ratio	Peak-Hour LOS
SR 4 east of Tracy Boulevard	0.36	C
SR 4 south of Cypress Road	0.50	D
SR 12 west of Terminous	0.61	D
SR 4 south of Delta Road	0.57	D

Source: Information on SR 4 east of Tracy Boulevard and SR 12 from Chalk pers. comm. Information on other segments taken from the range of volume-to-capacity ratios and LOS shown in Table 3L-1 for roadways with level terrain and having no-passing zones on 20% of the roadway length.

Table 3L-4. Trip Generation for the Delta Wetlands Project Islands (Peak Hour)

Condition and Location	Existing Conditions	Alternative 1 or 2	Alternative 3	No-Project Alternative
Construction				
Bacon Island	N/A	7	7	N/A
Webb Tract	N/A	9	9	N/A
Bouldin Island	N/A	3	16	N/A
Holland Tract	N/A	<u>1</u>	<u>11</u>	N/A
Total		20	43	
Operation and Maintenance				
Bacon Island	4	56	56	23
Webb Tract	4	55	55	19
Bouldin Island	3	49	50	20
Holland Tract	<u>1</u>	<u>31</u>	<u>42</u>	<u>12</u>
Total	12	191	203	74

Notes: Numbers have been rounded to the nearest number of trips.

N/A = not applicable.

Peak-hour trip generation is based on daily vehicle trip generation shown in Appendix L1. Peak-hour trip generation is generally equal to approximately 10% of daily trip generation. Therefore, the peak-hour trip generation shown in this table is equal to the daily vehicle trip generation shown in Appendix L1 divided by 10.

Sources: Construction trip generation: Stewart and Forkel pers. comms.; other trip generation: Forkel pers. comm.

Table 3L-5. Trip Generation Estimates for Recreational Vehicles and Boats by Season (Trips per Day) for Alternatives 1 and 3

Vehicle or Boat Type	Season	Bacon Island		Webb Tract		Bouldin Island		Holland Tract	
		Alternative 1	Alternative 3	Alternative 1	Alternative 3	Alternative 1	Alternative 3	Alternative 1	Alternative 3
Hunting-related vehicles	Nov-Jan	18	18	17	17	93	22	43	14
	Feb-May	0	0	0	0	0	0	0	0
	Jun-Aug	0	0	0	0	0	0	0	0
	Sep-Oct	0	0	0	0	0	0	0	0
Boating-related vehicles	Nov-Jan	68	68	68	68	58	62	36	50
	Feb-May	277	277	277	277	252	252	151	202
	Jun-Aug	485	485	485	485	441	441	265	353
	Sep-Oct	347	347	347	347	315	315	189	252
Other recreation-related vehicles	Nov-Jan	2	2	2	2	2	2	1	2
	Feb-May	8	8	8	8	8	8	5	6
	Jun-Aug	36	36	36	36	33	33	20	26
	Sep-Oct	16	16	16	16	14	14	9	11
Total recreation-related vehicles	Nov-Jan	88	88	87	87	153	85	80	65
	Feb-May	286	286	286	286	260	260	156	208
	Jun-Aug	521	521	521	521	474	474	284	379
	Sep-Oct	362	362	362	362	329	329	198	263
Hunting-related boats	Nov-Jan	18	18	18	18	93	22	43	14
	Feb-May	0	0	0	0	0	0	0	0
	Jun-Aug	0	0	0	0	0	0	0	0
	Sep-Oct	0	0	0	0	0	0	0	0
Boating-related boats	Nov-Jan	46	46	46	46	42	42	25	34
	Feb-May	185	185	185	185	168	168	101	134
	Jun-Aug	323	323	323	323	294	294	176	235
	Sep-Oct	231	231	231	231	210	210	126	168
Other recreation-related boats	Nov-Jan	0	0	0	0	0	0	0	0
	Feb-May	0	0	0	0	0	0	0	0
	Jun-Aug	0	0	0	0	0	0	0	0
	Sep-Oct	0	0	0	0	0	0	0	0
Total recreation-related boats	Nov-Jan	64	64	65	65	135	64	68	47
	Feb-May	185	185	185	185	168	168	101	134
	Jun-Aug	323	323	323	323	294	294	176	235
	Sep-Oct	231	231	231	231	210	210	126	168

Notes: Although 10% of other recreationists would boat to the project islands, these boat trips are not included in this analysis because their origin is unknown. Hunting-related boat trips would be on the interior of the project islands and would be of much shorter duration than boating-related boat trips, which would be taken on the exterior of the islands. Hunting-related boat trips would be taken in small outboard-engine fishing boats, whereas boating-related boat trips would be taken in larger inboard-engine boats.

Sources: Anderson, Boyce, Camper, Cochrell, Holmes, Ruth, Wagner, Williams, and Winther pers. comms.

Table 3L-6. Projected 2010 Traffic Volumes on Roadways near the Delta Wetlands Project Islands with and without the Project

Location	Future without Project		Future with Project				
			Construction		Operation		No-Project Alternative
	Average Daily Traffic	Peak-Hour Volume	Alternatives 1 or 2	Alternative 3	Alternatives 1 or 2	Alternative 3	
Bacon Island							
Bacon Island Road at the Bacon Island Road bridge	2,336	234	241	241	290	290	257
Lower Jones Road north of Cook Road	N/A	N/A	N/A	N/A	N/A	N/A	N/A
SR 4 east of Tracy Boulevard	9,000	1,100	1,109	1,114	1,171	1,177	1,127
Webb Tract							
Jersey Island Road north of Dutch Slough Road	200	20	26	26	75	75	39
Cypress Road west of Jersey Island Road	N/A	N/A	N/A	N/A	N/A	N/A	N/A
SR 4 south of Cypress Road	24,164	2,732	2,741	2,746	2,803	2,809	2,759
Bouldin Island							
SR 12 west of Terminous	24,000	2,900	2,903	2,916	2,949	2,950	2,920
Holland Tract							
Delta Road east of Byron Highway	N/A	N/A	N/A	N/A	N/A	N/A	N/A
SR 4 south of Delta Road	21,013	2,838	2,847	2,852	2,909	2,915	2,865

Notes: N/A = not available.

Operational volumes are equal to without-project volumes plus the estimated number of trips generated by the proposed project under the worst-case assumption that recreation, operations and maintenance, and agricultural traffic would all travel during the same peak hour.

^a The No-Project Alternative includes increased agricultural and recreational activities compared with existing conditions.

Source: Holland Tract and Webb Tract future without-project volumes from Johnson pers. comm.; Bacon and Bouldin Island future without-project volumes from Reed and Chalk pers. comms.

Table 3L-7. Projected Volume-to-Capacity Ratios and Levels of Service on Roadways near the Delta Wetlands Project Islands, with Existing Roadway Configuration, with and without the Project

Location	Future with Project					
	Future without Project	Construction		Operation		No-Project Alternative
		Alternatives 1 or 2	Alternative 3	Alternatives 1 or 2	Alternative 3	
Bacon Island						
Bacon Island Road at the Bacon Island Road bridge	0.08 (A)	0.09 (A)	0.09 (A)	0.10 (A)	0.10 (A)	0.09 (A)
Lower Jones Road north of Cook Road	N/A	N/A	N/A	N/A	N/A	N/A
SR 4 east of Tracy Boulevard	0.56 (D)	0.57 (D)	0.57 (D)	0.60 (D)	0.60 (D)	0.57 (D)
Webb Tract						
Jersey Island Road north of Dutch Slough Road	0.04(A)	0.05(A)	0.05(A)	0.15(B)	0.15(B)	0.08(A)
Cypress Road west of Jersey Island Road	N/A	N/A	N/A	N/A	N/A	N/A
SR 4 south of Cypress Road	0.98 (E)	0.98 (E)	0.98 (E)	1.00 (F)	1.00 (F)	0.99 (E)
Bouldin Island						
SR 12 west of Terminous	1.29 (F)	1.29 (F)	1.30 (F)	1.31 (F)	1.31 (F)	1.30 (F)
Holland Tract						
Delta Road east of Byron Highway	N/A	N/A	N/A	N/A	N/A	N/A
SR 4 south of Delta Road	1.01 (F)	1.02 (F)	1.02 (F)	1.04 (F)	1.04 (F)	1.02 (F)

Notes: N/A = not available.

Numbers in table represent volume-to-capacity ratio. Letters in parentheses represent the corresponding level of service.

These estimates are based on the future traffic volumes with and without the proposed project shown in Table 3L-5 using the existing road facilities.

Source: Information on SR 4 east of Tracy Boulevard and SR 12 from Chalk pers. comm. Information on other segments estimated based on Tables 3L-5 and 3L-3.

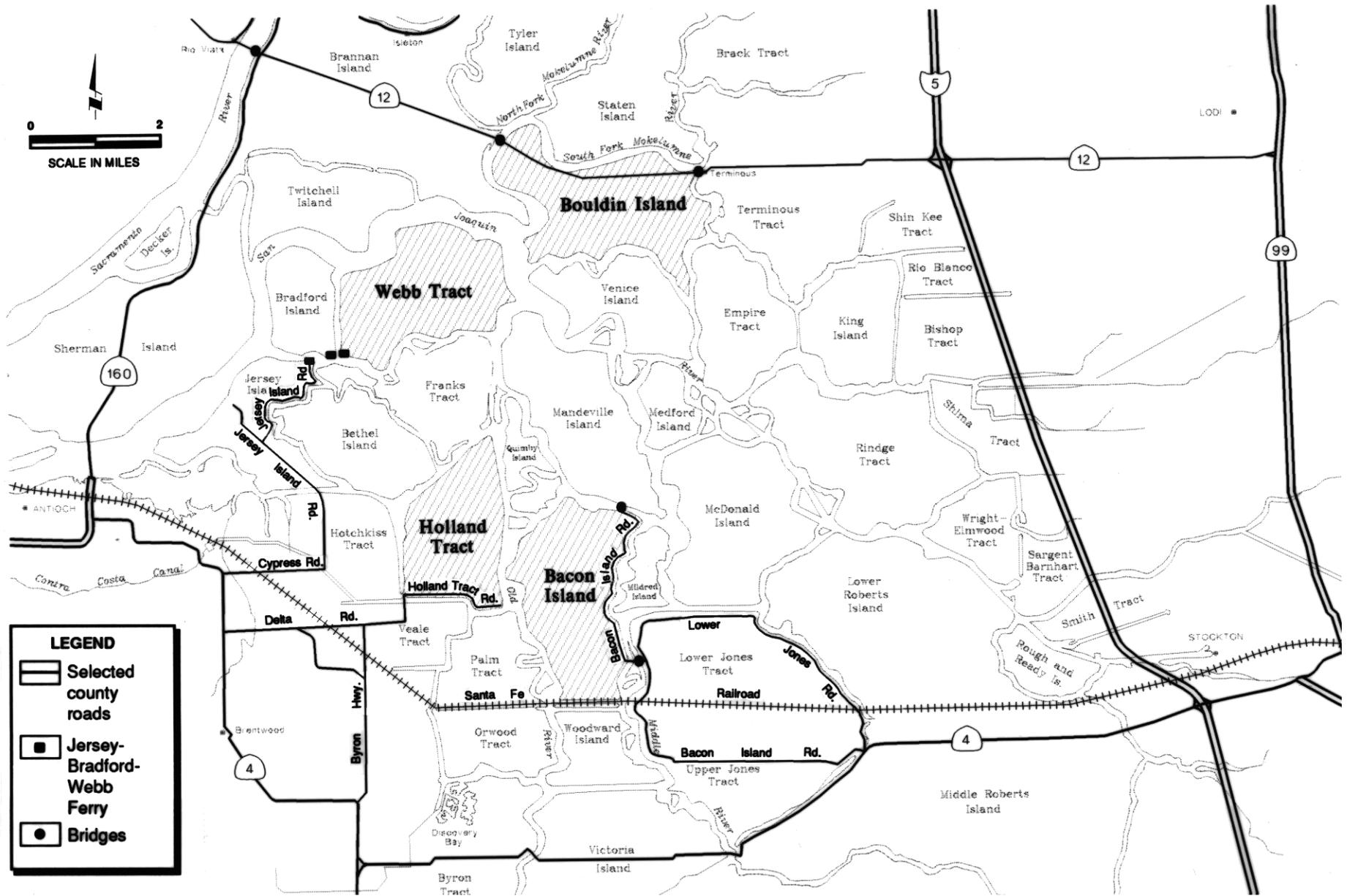
Table 3L-8. Projected Volume-to-Capacity Ratios and Levels of Service on Roadways near the Delta Wetlands Project Islands, with Improved Roadway Configuration, with and without the Project

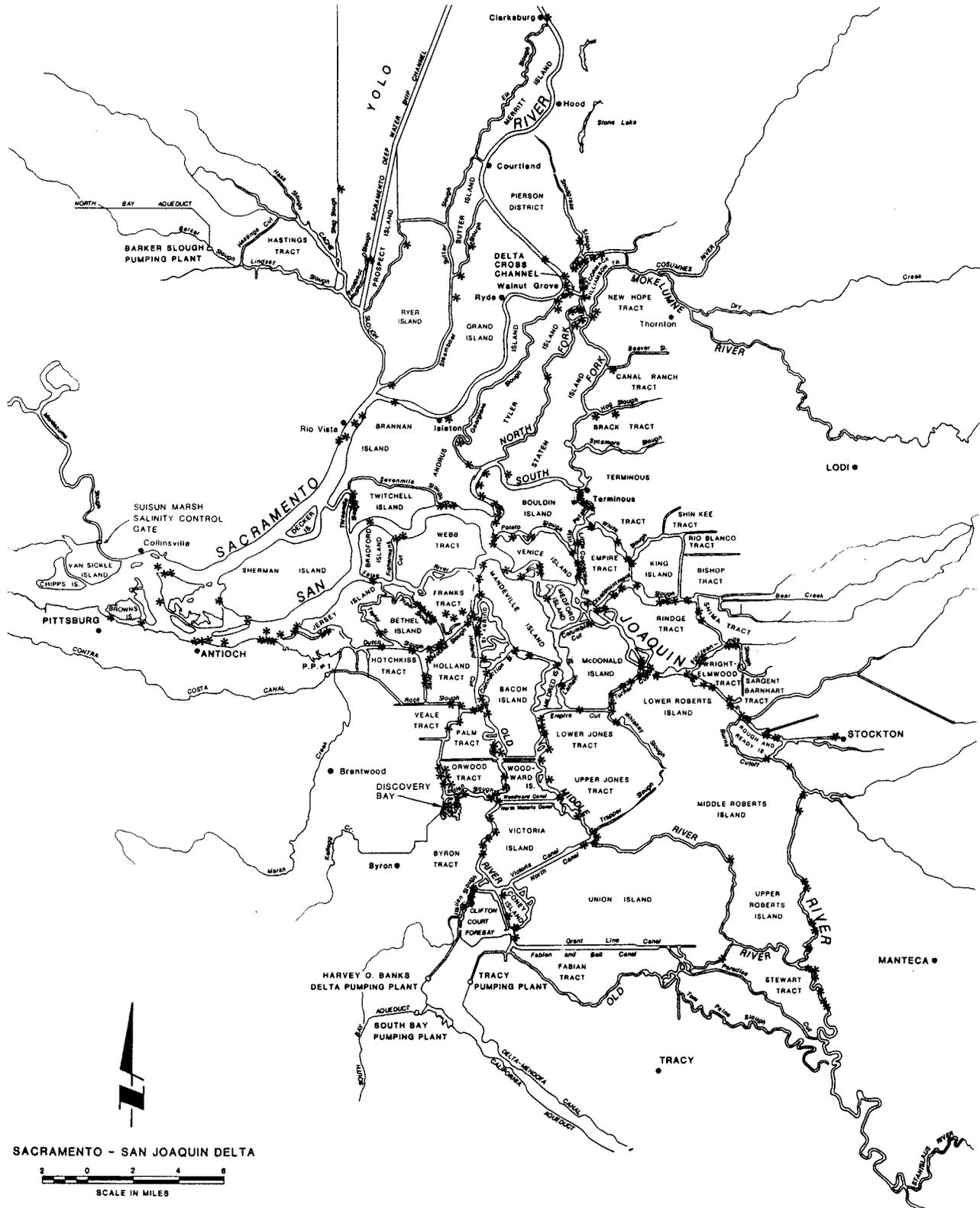
Location	Future without Project	Future with Project					No-Project Alternative
		Construction		Operation			
		Alternatives 1 or 2	Alternative 3	Alternative 1 or 2	Alternative 3		
Bacon Island							
Bacon Island Road at the Bacon Island Road bridge	0.08 (A)	0.09 (A)	0.09 (A)	0.10 (A)	0.10 (A)	0.09 (A)	
Lower Jones Road north of Cook Road	N/A	N/A	N/A	N/A	N/A	N/A	
SR 4 east of Tracy Boulevard	0.54 (C/D)	0.54 (C/D)	0.55 (C/D)	0.57 (C/D)	0.58 (C/D)	0.55 (C/D)	
Webb Tract							
Jersey Island Road north of Dutch Slough Road	0.04(A)	0.05(A)	0.05(A)	0.15(B)	0.15(B)	0.08(A)	
Cypress Road west of Jersey Island Road	N/A	N/A	N/A	N/A	N/A	N/A	
SR 4 south of Cypress Road	0.49 (D)	0.49 (D)	0.49 (D)	0.50 (D)	0.50 (D)	0.50 (D)	
Bouldin Island							
SR 12 west of Terminous	0.48 (B)	0.48 (B)	0.49 (B)	0.49 (B)	0.49 (B)	0.49 (B)	
Holland Tract							
Delta Road east of Byron Highway	N/A	N/A	N/A	N/A	N/A	N/A	
SR 4 south of Delta Road	0.51 (D)	0.51 (D)	0.51 (D)	0.52 (D)	0.52 (D)	0.51 (D)	

Notes: N/A = not available.

1. Numbers in table represent volume-to-capacity ratio. Letters in parentheses represent the corresponding level of service.
2. These estimates are based on the future traffic volumes with and without the proposed project shown in Table 3L-5 using the improved roadway configuration.
3. Improvement to four lanes on SR 12 west of Terminous, SR 4 south of Delta Road, and SR 4 south of Cypress Road are Caltrans concepts but are not currently programmed or funded.
4. Full widening has not been planned for SR 4 east of Tracy Boulevard; however, Caltrans has proposed constructing passing lanes at selected locations and new bridges at Old and Middle Rivers (west of Tracy Boulevard).

Source: Information on SR 4 east of Tracy Boulevard and SR 12 from Chalk pers. comm. Information on other segments estimated based on Tables 3L-5 and 3L-3.





Source: California Department of Boating and Waterways 1986.