

CHAPTER 5 - ENVIRONMENTAL CONSEQUENCES*

5.1 ENVIRONMENTAL EVALUATION METHODOLOGY

This chapter describes the analysis of potential environmental effects of the no-action and final array of combined action alternative plans (combined alternatives 1, 5 and 6). In general, construction of the no-action and action alternatives could result in short-term environmental effects, while long-term effects of the alternatives could result from operation and maintenance activities throughout the period of analysis. Construction effects are measured from existing conditions and no-action conditions.

The evaluation of effects is based upon a comparison of conditions with and without the implementation of an alternative plan. Each description of an effect describes whether the effect is beneficial or adverse. In addition, the discussions identify direct, indirect and cumulative effects, as well as, any necessary mitigation measures.

Table 5-1: Summary of Environmental Effects, Mitigation, and Levels of Significance illustrates the potential effects and mitigation measures to both significant resources and those resources eliminated from detailed analysis. Additional information can be found in Appendix B - Environmental and Regulatory Agreement Documents.

TABLE 5-1: SUMMARY OF ENVIRONMENTAL EFFECTS, MITIGATION, AND LEVELS OF SIGNIFICANCE

Resources	No Action	Combined Alternative 1	Combined Alternative 5	Combined Alternative 6
Geomorphology				
Temporary Effects	The river would remain in the same channel it is today and not migrate	No temporary construction effects. NE	No temporary construction effects. NE	No temporary construction effects. NE
Mitigation	Not applicable.	No mitigation required.	No mitigation required.	No mitigation required.
Permanent Effects	The "J" levee would continue to be privately maintained and in relatively poor geotechnical condition. Extensive flood fighting would continue to be required. Erosion of the levee toe at the northern end of the "J" levee. Glenn County backup levee would maintain flood control.	Would neither increase nor decrease river migration rate. NE	Would neither increase nor decrease river migration rate. NE	Would neither increase nor decrease river migration rate. NE
Mitigation	Not applicable.	No mitigation required.	No mitigation required.	No mitigation req'd.
River Hydraulics				
Effects	No significant changes in the flood management system that would alter river hydraulics are currently planned by flood control agencies.	Implementation would result in positive effects on flood protection to the local community. No adverse hydraulic effects would occur. NE	Implementation would result in positive effects on flood protection to the local community. No adverse hydraulic effects would occur. NE	Implementation would result in positive effects on flood protection to the local community. No adverse hydraulic effects would occur. NE

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Resources	No Action	Combined Alternative 1	Combined Alternative 5	Combined Alternative 6
Mitigation	Not applicable.	No mitigation required.	No mitigation required.	No mitigation required.
Water Quality				
Temporary Effects	Water quality would be similar to existing conditions.	Levee removal may result in temporary degradation of water quality. S	Levee removal may result in temporary degradation of water quality. S	Levee removal may result in temporary degradation of water quality. S
Mitigation	Not applicable.	Use BMP's to prevent sediment runoff from entering the river. LS	Use BMP's to prevent sediment runoff from entering the river. LS	Use BMP's to prevent sediment runoff from entering the river. LS
Permanent Effects	Projects assumed under the future with-out project condition such as CALFED, Central Valley Improvement Act (CVPIA), and the TNC Sacramento River Project seek to maintain high water quality.	Water quality of surface runoff is expected to improve due to increased vegetative cover, reduced tillage, reduced use of well water, and reduced application of agricultural chemicals. Benefits from recharge of groundwater supplies due to temporary storage area created. New levee would be constructed between the wastewater treatment facility and the Sacramento River. Would decrease the risk of sewage spills due to flooding. B	Beneficial effects would be similar to those discussed for Alternative 1, except no benefit due to improved protection of the wastewater treatment plant. The setback levee would be constructed through the existing Hamilton City Irrigation Ditch, considered a seasonal wetland habitat by the USFWS. S	Water quality of surface runoff is expected to improve due to increased vegetative cover, reduced tillage, reduced use of well water, and reduced application of agricultural chemicals. Benefits from recharge of groundwater supplies due to temporary storage area created. New levee would be constructed between the wastewater treatment facility and the Sacramento River. Would decrease the risk of sewage spills due to flooding. B
Mitigation	Not applicable.	No mitigation required.	In kind wetland of 45 acres would be created. Construction would occur in dry season. LS	No mitigation required.
Air Quality				
Temporary Effects	Present trends in degradations to air quality can be expected to continue.	Construction would result in temporary degradation of air quality from dust and emissions from construction equipment. S	Construction would result in temporary degradation of air quality from dust and emissions from construction equipment, though construction time would be less than Combined Alternative 1. S	Construction would result in temporary degradation of air quality from dust and emissions from construction equipment, and construction time would be more than Combined Alternative 1. S
Mitigation	Not applicable.	Use BMP's to reduce fugitive dust and pollutant emissions during construction. LS	Use BMP's to reduce fugitive dust and pollutant emissions during construction. LS	Use BMP's to reduce fugitive dust and pollutant emissions during construction. LS
Permanent Effects	An Air Quality Attainment Plan for the air basin has been developed to regulate air emissions although overall emissions are	Air quality would be improved in the long term with the restoration of habitat and the reduction of the amount of agriculture related	Air quality would be improved in the long term with the restoration of habitat and the reduction of the amount of agriculture	Air quality would be improved in the long term with the restoration of habitat and the reduction of the amount of

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	expected to increase.	emissions. B	related emissions. B	agriculture related emissions. B
Mitigation	Not applicable.	No mitigation required.	No mitigation required.	No mitigation required.
Biological Environment				
Vegetation				
Temporary Effects	Land currently in agriculture is expected to stay in agriculture. Vegetation on the levee would be maintained as it is today.	Temporary impacts to vegetation would result from the removal of orchards in the restoration areas and grasslands within the existing levee alignment. LS	Temporary impacts to vegetation would result from the removal of orchards in the restoration areas and grasslands within the existing levee alignment. LS	Temporary impacts to vegetation would result from the removal of orchards in the restoration areas and grasslands within the existing levee alignment. LS
Mitigation	Not applicable.	These losses are accounted for in the overall benefit evaluation. Therefore, no mitigation is required.	These losses are accounted for in the overall benefit evaluation. Therefore, no mitigation is required.	These losses are accounted for in the overall benefit evaluation. Therefore, no mitigation is required.
Permanent Effects	Younger orchards are expected to remain in production for many years. Older orchards are expected to be replanted. Some existing grassland may be converted to orchard.	Long term benefits to vegetation are expected with the restoration of 1,300 acres comprised of riparian, grassland, savannah, and scrub habitats. B	Long term benefits to vegetation are expected with the restoration of 1,600 acres comprised of riparian, grassland, Savannah, and scrub habitats. B In addition, 15 acres of seasonal wetland would be lost by construction of the new levee. S	Long term benefits to vegetation are expected with the restoration of 1,500 acres comprised of riparian, grassland, savannah, and scrub habitats. B
Mitigation	Not applicable.	No mitigation required.	In-kind seasonal wetland of 45 acres would be created. LS	No mitigation required.
Wildlife				
Temporary Effects	Since no change in vegetation is expected, no change in wildlife values is anticipated.	Species present may experience temporary disturbance and/or displacement due to construction, but would return after construction was completed. LS	Species present may experience temporary disturbance and/or displacement due to construction, but would return after construction was completed. Fewer impacts due to shorter construction time and shorter levee length. LS	Species present may experience temporary disturbance and/or displacement due to construction, but would return after construction. As compared to the other 2 action alternatives, a slight increase in effects due to longer construction time and longer levee length. LS
Mitigation	Not applicable.	No mitigation required.	No mitigation required.	No mitigation required.
Permanent Effects	Ongoing restoration efforts in the region will likely provide some localized benefits.	An increase in vegetation along the river within the restored area would provide additional habitat for species, improving the biological diversity of surrounding	An increase in vegetation along the river within the restored area would provide additional habitat for species, improving the biological	An increase in vegetation along the river within the restored area would provide additional habitat for species, improving the

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Resources	No Action	Combined Alternative 1	Combined Alternative 5	Combined Alternative 6
		areas. In addition, the restoration area can serve as a pathway for movement between habitats along river corridor. B	diversity of surrounding areas. In addition, the restoration area can serve as a pathway for movement between habitats along river corridor. B	biological diversity of surrounding areas. In addition, the restoration area can serve as a pathway for movement between habitats along the river corridor. B
Mitigation	Not applicable.	No mitigation required.	No mitigation required.	No mitigation required.
Fisheries and Aquatic Resources				
Temporary Effects	Not applicable.	Increased sediment contribution to the river during construction and removal of the levee may impact fisheries. LS	Increased sediment contribution to the river during construction and removal of the levee may impact fisheries. LS	Increased sediment contribution to the river during construction and removal of the levee may impact fisheries. LS
Mitigation	Not applicable.	Use BMP's to prevent sediment runoff from entering the river.	Use BMP's to prevent sediment runoff from entering the river.	Use BMP's to prevent sediment runoff from entering the river.
Permanent Effects	Restoration programs such as CALFED, which target fisheries, may improve fisheries in the future throughout the Sacramento watershed.	The restoration would serve as a seasonally inundated rearing habitat for fisheries. The restoration area of 1,300 acres provides LWD, SRA, natural banks, and natural plant propagation which benefits fisheries. B	The restoration would serve as a seasonally inundated rearing habitat for fisheries. The restoration area of 1,600 acres provides LWD, SRA, natural banks, and natural plant propagation which benefits fisheries. B	The restoration would serve as a seasonally inundated rearing habitat for fisheries. The restoration area of 1,500 acres provides LWD, SRA, natural banks, and natural plant propagation which benefits fisheries. B
Mitigation	Not applicable.	No mitigation required.	No mitigation required.	No mitigation required.
Special Status Species				
Temporary Effects	Conversion of one crop to another or agriculture to urban uses may affect special status species.	1. Yellow-billed cuckoo, bank swallow, and Swainson's hawk may experience temporary disturbance and/or displacement due to construction. S 2. Anadromous fish may be subject to short-term exposure to increased turbidity during construction. S	1. Yellow-billed cuckoo, bank swallow, and Swainson's hawk may experience temporary disturbance and/or displacement due to construction. S 2. Anadromous fish may be subject to short-term exposure to increased turbidity during construction. S	1. Yellow-billed cuckoo, bank swallow, and Swainson's hawk may experience temporary disturbance and/or displacement due to construction. S 2. Anadromous fish may be subject to short-term exposure to increased turbidity during construction. S
Mitigation	Not applicable.	1. Surveys would be conducted prior to construction to determine presence or absence of special status species in the project area and specific	1. Surveys would be conducted prior to construction to determine presence or absence of special status species in the project area and	1. Surveys would be conducted prior to construction to determine presence or absence of special status species in the project area and

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Resources	No Action	Combined Alternative 1	Combined Alternative 5	Combined Alternative 6
		avoidance and minimization measures (BMPs) would be implemented, if necessary. LS 2. BMP's to minimize turbidity effects to fish would be implemented. LS	specific avoidance and minimization measures (BMPs) would be implemented, if necessary. LS 2. BMP's to minimize turbidity effects to fish would be implemented. LS	specific avoidance and minimization measures (BMPs) would be implemented, if necessary. LS 2. BMP's to minimize turbidity effects to fish would be implemented. LS
Permanent Effects	Compliance with Federal and State ESA could slow negative impacts of urban development on special status species.	1. Anadromous fish would be adversely affected by placement of rock in bank habitat. Increased access to the floodplain would increase the risk of stranding. S 2. The quantity and variety of special status species, in particular the anadromous fish, valley elderberry longhorn beetle, Swainson's hawk, and western yellow-billed cuckoo, are expected to increase as a result of the restoration. B	1. Anadromous fish would be adversely affected by placement of rock in bank habitat. Increased access to the floodplain would increase the risk of stranding. S 2. The quantity and variety of special status species, in particular the anadromous fish, valley elderberry longhorn beetle, Swainson's hawk, and western yellow-billed cuckoo, are expected to increase as a result of the restoration. B	1. Anadromous fish would be adversely affected by placement of rock in bank habitat. Increased access to the floodplain would increase the risk of stranding. S 2. The quantity and variety of special status species, in particular the anadromous fish, valley elderberry longhorn beetle, Swainson's hawk, and western yellow-billed cuckoo, are expected to increase as a result of the restoration. B
Mitigation	Not applicable.	1. Improved access to floodplain habitat and aquatic habitat improvements due to restoration would more than offset any adverse effects. B 2. No mitigation required; but elderberry shrub plantings (1-5/1,800 square feet in riparian and savannah habitats) would be included in the planting plan to benefit the VELB. B	1. Improved access to floodplain habitat and aquatic habitat improvements due to restoration would more than offset any adverse effects. B 2. No mitigation required; but elderberry shrub plantings (1-5/1,800 square feet in riparian and savannah habitats) would be included in the planting plan to benefit the VELB. B	1. Improved access to floodplain habitat and aquatic habitat improvements due to restoration would more than offset any adverse effects. B 2. No mitigation required; but elderberry shrub plantings (1-5/1,800 square feet in riparian and savannah habitats) would be included in the planting plan to benefit the VELB. B
Cultural Environment				
Cultural Resources				
Temporary Effects	Conditions of cultural resources sites within the proposed project area would remain the same.	A historic Indian mound site may be affected, though the site has been used for agriculture and likely has no effect. Other sites are outside the project area. LS	A historic Indian mound site may be affected, though the site has been used for agriculture and likely has no effect. Other sites are outside the project area. LS	A historic Indian mound site may be affected, though the site has been used for agriculture and likely has no effect. Other sites are outside the project area. LS

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Resources	No Action	Combined Alternative 1	Combined Alternative 5	Combined Alternative 6
Mitigation	Not applicable.	A records and literature search and field survey would determine the existence of historic properties. The eligibility of any properties would be determined and the SHPO would be consulted.	A records and literature search and field survey would determine the existence of historic properties. The eligibility of any properties would be determined and the SHPO would be consulted.	A records and literature search was conducted and subsequent field survey would determine the existence of historic properties. The eligibility of any properties would be determined and the SHPO would be consulted.
Permanent Effects	Levee failure and resultant flooding could damage archeological sites in the project area.	Gianelli Bridge may undergo modifications. The bridge has been modernized and is no longer considered historic. NE	Gianelli Bridge may undergo modifications. The bridge has been modernized and is no longer considered historic. NE	Gianelli Bridge may undergo modifications. The bridge has been modernized and is no longer considered historic. NE
Mitigation	Not applicable.	No mitigation required.	No mitigation required.	No mitigation required.
Socio-Economic Resources				
Socio-economic				
Temporary Effects	Not applicable.	Construction related jobs would bring income to the region. B	Construction related jobs would bring income to the region. B	Construction related jobs would bring income to the region. B
Mitigation	Not applicable.	No mitigation required.	No mitigation required.	No mitigation required.
Permanent Effects	The county maintains a pro-economic growth policy and it is expected the county will continue to pursue these goals.	The loss of 1,300 acres of agricultural land would result in the loss of approximately 31 agricultural jobs. Economic gains would result from reduced flood damages, and an increase in jobs in construction, ecosystem management, and recreation. LS	The loss of 1,600 acres of agricultural land would result in the loss of approximately 39 agricultural jobs. Economic gains would result from reduced flood damages, and an increase in jobs in construction, ecosystem management, and recreation. LS	The loss of 1,500 acres of agricultural land would result in the loss of approximately 36 agricultural jobs. Economic gains would result from reduced flood damages, and an increase in jobs in construction, ecosystem management, and recreation. LS
Mitigation	Not applicable.	No mitigation is required.	No mitigation is required.	No mitigation is required.
Agricultural/Prime and Unique Farmlands				
Temporary Effects	Not applicable.	Not applicable. NE	Not applicable. NE	Not applicable. NE
Mitigation	Not applicable.	No mitigation required.	No mitigation required.	No mitigation required.
Permanent Effects	Conversion of agricultural land to urban uses will continue.	Conversion of 1,300 acres of farmland would not be an irretrievable effect. Some farmlands would benefit from improved flood protection. Acreage in Williamson Act	Conversion of 1,600 acres of farmland would not be an irretrievable effect. Some farmlands would benefit from improved flood protection. Acreage in	Conversion of 1,500 acres of farmland would not be an irretrievable effect. Some farmlands would benefit from improved flood

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		contracts is 283 acres plus 100.7 acres in Farmland Security Zone contracts. LS	Williamson Act contracts is 472 acres plus 100.7 acres in Farmland Security Zone contracts. LS	protection. Acreage in Williamson Act contracts is 472 acres plus 100.7 acres in Farmland Security Zone contracts. LS
Mitigation	Not applicable.	The project would be consistent with the CALFED ROD for conversion of agricultural lands to restoration.	The project would be consistent with the CALFED ROD for conversion of agricultural lands to restoration.	The project would be consistent with the CALFED ROD for conversion of agricultural lands to restoration.
Urban Land Use				
Temporary Effects	Not applicable.	No temporary effects. NE	No temporary effects. NE	No temporary effects. NE
Mitigation	Not applicable.	No mitigation required.	No mitigation required.	No mitigation required.
Permanent Effects	Urban development trends in California would continue with increasing population levels. Acres would continue to move from other categories to urban use.	Project is outside the urban growth limit for Hamilton City and would not have significant effects on urban land growth. Setback levee would increase flood protection to urban area. B	Project is outside the urban growth limit for Hamilton City and would not have significant effects on urban land growth. Setback levee would increase flood protection to urban area. B	Project is outside the urban growth limit for Hamilton City and would not have significant effects on urban land growth. Setback levee would increase flood protection to urban area. B
Mitigation	Not applicable.	No mitigation required.	No mitigation required.	No mitigation required.
Transportation				
Temporary Effects	Not applicable.	Construction activities would generate additional traffic and potential disruptions due to construction-related detours. Increased truck traffic may adversely affect safety and roadway conditions. S	Construction activities would generate additional traffic and potential disruptions due to construction-related detours. Increased truck traffic may adversely affect safety and roadway conditions. S	Construction activities would generate additional traffic and potential disruptions due to construction-related detours. Increased truck traffic may adversely affect safety and roadway conditions. S
Mitigation	Not applicable.	An access management plan would be prepared and implemented prior to initiation of construction. LS	An access management plan would be prepared and implemented prior to initiation of construction. LS	An access management plan would be prepared and implemented prior to initiation of construction. LS
Permanent Effects	More roads and other transportation infrastructure is expected and traffic is expected to increase.	Transportation on Highway 32 would benefit from increased flood protection. B	Transportation on Highway 32 would benefit from increased flood protection. B	Transportation on Highway 32 would benefit from increased flood protection. B
Mitigation	Not applicable.	No mitigation required.	No mitigation required.	No mitigation required.
Recreation				
Temporary Effects	Not applicable.	Recreation activities may be temporarily impacted during construction. Boat launching facilities would	Recreation activities may be temporarily impacted during construction. Boat	Recreation activities may be temporarily impacted during construction. Boat

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Resources	No Action	Combined Alternative 1	Combined Alternative 5	Combined Alternative 6
		be temporarily closed during construction but not during prime fishing season. LS	launching facilities would be temporarily closed during construction but not during prime fishing season. LS	launching facilities would be temporarily closed during construction but not during prime fishing season. LS
Mitigation	Not applicable.	Provide notice and signage to redirect use. Any structure at the Irvine Finch boat launch facility would be replaced.	Provide notice and signage to redirect use. Any structure at the Irvine Finch boat launch facility would be replaced.	Provide notice and signage to redirect use. Any structure at the Irvine Finch boat launch facility would be replaced.
Permanent Effects	The demands on recreation facilities is expected to increase with an increase in population.	Compatible with additional recreation planned for the area. NE	Compatible with additional recreation planned for the area. NE	Compatible with additional recreation planned for the area. NE
Mitigation	Not applicable.	No mitigation required.	No mitigation required.	No mitigation required.
Aesthetics				
Temporary Effects	Not applicable.	Construction activities would temporarily affect aesthetics. LS	Construction activities would temporarily affect aesthetics. LS	Construction activities would temporarily affect aesthetics. LS
Mitigation	Not applicable.	No mitigation required.	No mitigation required.	No mitigation required.
Permanent Effects	Aesthetic conditions will likely remain the same as they currently are.	The restoration of riparian, scrub, savannah, and grassland habitats would improve aesthetic resources along the river. This would be a beneficial effect. B	The restoration of riparian, scrub, savannah, and grassland habitats would improve aesthetic resources along the river. This would be a beneficial effect. B	The restoration of riparian, scrub, savannah, and grassland habitats would improve aesthetic resources along the river. This would be a beneficial effect. B
Mitigation	Not applicable.	No mitigation required.	No mitigation required.	No mitigation required.
Noise				
Temporary Effects	Not applicable.	Temporary increase in noise levels during construction. LS	Temporary increase in noise levels during construction. LS	Temporary increase in noise levels during construction. LS
Mitigation	Not applicable.	Use BMP's to reduce noise levels caused by construction equipment.	Use BMP's to reduce noise levels caused by construction equipment	Use BMP's to reduce noise levels caused by construction equipment
Permanent Effects	Sources of noise levels are expected to remain the same in the future.	Conversion of agricultural areas to restoration would reduce noise from agricultural equipment. B	Conversion of agricultural areas to restoration would reduce noise from agricultural equipment. B	Conversion of agricultural areas to restoration would reduce noise from agricultural equipment. B
Mitigation	Not applicable.	No mitigation required.	No mitigation required.	No mitigation required.
HTRW				
Effects	Any existing HTRW would remain unless the State forces	Reduced potential for dispersal of agricultural chemicals in runoff. B	Reduced potential for dispersal of agricultural chemicals in runoff. B	Reduced potential for dispersal of agricultural

Resources	No Action	Combined Alternative 1	Combined Alternative 5	Combined Alternative 6
	remediation of the sites.			chemicals in runoff. B
Mitigation	Not applicable.	No mitigation required.	No mitigation required.	No mitigation required.

¹Levels of significance are provided before and after mitigation for each effect.

²NE = No effect; B = Beneficial effect; LS = Less-than-significant effect; S = Significant effect.

5.2 RESOURCES ELIMINATED FROM DETAILED ANALYSIS

Project alternatives would have no effect on topography, geology, soils, climate, hydrology, and wild and scenic rivers; therefore, these resources have been eliminated from detailed analysis.

5.3 EFFECTS ON SIGNIFICANT RESOURCES

5.3.1 Geomorphology

This section identifies and evaluates potential geomorphological effects of the proposed alternatives and recommends measures to avoid or minimize these effects.

Basis of Significance. The evaluation includes effects such as significant changes in the ability of the river to meander. The effects would be considered significant if there is a reduction in the river's ability to meander over the 50-year period of analysis. The proposed action would also be considered to have a significant effect if it would decrease channel stability, thereby threatening levee structures, local property, or infrastructure.

Effects

No-Action Alternative

The no-action alternative would not include removing the "J" levee or building a setback levee. In spite of the rock riprap bank protection that exists within the project area, the river will still migrate, particularly during large events. The non-Federal sponsor would continue to operate and maintain the rock placed as part of the Chico Landing to Red Bluff project, but deterioration of the riprap is expected over time. Any future maintenance would need to be accomplished in accordance with the jeopardy opinion, pertaining to the valley elderberry longhorn beetle, issued for that project by the USFWS. The "J" levee would continue to be privately maintained and in relatively poor geotechnical condition. Extensive flood fighting of the "J" levee would continue to be necessary to maintain the integrity of the levee when water levels rise in the Sacramento River. Erosion of the levee toe at the northern end of the "J" levee would continue, but the Glenn County backup levee would maintain the flood control function of the "J" levee.

Combined Alternative 1

Combined Alternative 1 would include setting back the levee for approximately 5.5 miles and allowing over bank flows within the area between the setback and the channel. To compensate for potential effects on the Gianella Bridge due to removal of the existing levee, 1,000 feet of rock revetment would be placed landside of the existing levee along the

road embankment at Highway 32 to prevent the river from migrating at the bridge. Also, up to 100 feet of rock and/or grouted rock and/or a concrete lining would be placed under the Gianella Bridge at Highway 32 abutment specifically to protect it from exposure to higher velocities resulting from passing higher flows. Another 1,000 feet of rock revetment would be placed at two turns in the setback levee in the Dunning slough area. In the northern end of the setback along County Road 45, approximately 1,600 feet of rock would be entrenched to protect the setback levee and prevent the river from migrating past this point. At the southern end of the levee dense vegetation would be planted to protect the levee from eroding.

Because rock is not being placed in the active channel and because the County's backup levee would continue to be maintained, this alternative plan would not additionally reduce the ability of the river to meander over the 50-year period of analysis. Furthermore, since removal of existing rock was dropped as a measure (see expanded discussion in Chapter 3), Combined Alternative 1 would not decrease channel stability, and therefore would not increase the rate of river migration.

Combined Alternative 5

Combined Alternative 5 would include setting back the levee for approximately 5.3 miles and allowing over bank flows within the area between the setback and the channel. To compensate for potential effects on the Gianella Bridge due to removal of the existing levee, one thousand feet of rock revetment would be placed landside of the existing levee along the road embankment at Highway 32 to prevent the river from migrating at the bridge. Also, up to 100 feet of rock and/or grouted rock and/or a concrete lining would be placed under the Gianella Bridge at Highway 32 abutment specifically to protect it from exposure to higher velocities resulting from passing higher flows. Another 1,000 feet of rock revetment would be placed at two turns in the setback levee in the Dunning slough area. In the northern end of the setback along County Road 45, approximately 1,600 feet of rock would be entrenched to protect the setback levee and prevent the river from migrating past this point. At the southern end of the levee, dense vegetation would be planted to protect the levee from eroding.

As for Combined Alternative 1, this plan would not reduce the ability of the river to meander over the 50-year period of analysis nor decrease channel stability, and therefore would not increase the rate of river migration.

Combined Alternative 6

Combined Alternative 6 would have similar geomorphological effects as Combined Alternative 5 with a reduction in the amount of rock revetment placed in the Dunning Slough area. Combined Alternative 6 would only include 500 feet of rock revetment placed in the Dunning Slough area. The southern end of the levee would be planted in vegetation and would extend approximately 1.1 miles south of Road 23.

This plan would not reduce the ability of the river to meander over the 50-year period of analysis nor decrease channel stability, and therefore would not increase the rate of river migration.

Mitigation Measures

Since there would be no effect on Geomorphology, no mitigation would be required.

5.3.2 River Hydraulics

The objectives of this study are ecosystem restoration and flood damage reduction. The conveyance characteristics of the river would be modified in the process of achieving these objectives. Any such modifications have the potential to create unintended changes in the behavior of flows within the project area or either upstream or downstream from the project area. This section identifies and evaluates potential effects of the proposed alternatives on river hydraulics and recommends measures to avoid or minimize these effects.

Basis of Significance. The evaluation of significance is based on changes in the water surface elevation of flood flows. The effects would be considered significant if there are any unintended measurable increases in flood stage outside of the river channel.

Effects

No-Action Alternative

The no-action alternative would not include removing the "J" levee or building a setback levee. The "J" levee would continue to be privately maintained and in relatively poor geotechnical condition. Extensive flood fighting of the "J" levee would continue to be necessary to maintain the integrity of the levee when water levels rise in the Sacramento River. Erosion of the levee toe at the northern end of the "J" levee would continue, but the Glenn County backup levee would maintain the flood control function of the "J" levee.

River hydraulics are not expected to change much relative to the existing condition. No significant changes in the flood management system that would alter river hydraulics are currently planned by flood control agencies. Potential future watershed activities could result in lower flood stages in places if some levees are removed or higher stages in places if increased vegetation impedes flood flows.

Combined Alternative 1

Combined Alternative 1 would provide the community of Hamilton City with a 90 percent confidence of passing a 75-year event. This protection would also be provided to lands north of Highway 32 and to about Holly Sugar Plant south of Highway 32. This alternative would provide a 90 percent confidence of passing a 35-year event from south of Dunning Slough to just north of County Road 23. The training dike would provide a 90 percent confidence of passing an 11-year event to lands south of County Road 23. The training dike would also reduce frequent scouring flood flows and provide additional flood damage reduction benefits to structures within Hamilton City by lowering backwater flows.

These flood protection improvements are achieved by increasing the floodplain in the project area through removing the existing levee and constructing a setback levee further from the main channel. These actions would increase the cross-sectional area over which flows would spread, thereby decreasing the stage, or water level, of the river under most conditions. However, the effect on stage is complicated by some additional factors. First, flow is constrained by the constriction of the channel at Gianella Bridge on Highway 32. Second, the increase in vegetation within the floodplain, which would result from the restoration efforts, would tend to slow flows and cause an increase in stage, counteracting the stage reduction benefits of a wider floodplain. Finally, as flows spread, they slow down, and as they slow down, stage tends to increase. To evaluate all of these factors and to

determine the height of the levee required for the desired flood protection, modeling efforts were undertaken.

Results from Hydraulic modeling have shown that widening the floodway on the western side of the Sacramento River has reduced stages in Butte County. In addition, the water surface elevation near Big Chico Creek has been reduced, resulting in less overflow to Butte Basin. The reduction in flow has been on the order of magnitude of 2,000 cubic feet per second (cfs) while the Sacramento River is conveying roughly 343,000 cfs.

Combined Alternative 1 would have positive effects for both Glenn and Butte counties and would provide regional benefits downstream by adding more storage in the system. In spite of these benefits, this alternative would also result in a local increase in the water surface elevation north of the Highway 32 Bridge, but only within the Sacramento River channel. The area just east of this zone, in Butte County, shows a decrease in water surface elevation. The decrease in water surface elevation on the Butte County side suggests that additional flow is being conveyed through the Sacramento River. With the increase in flow, the bridge acts as a control causing a localized increase in the water surface to push flow under the bridge.

Combined Alternative 1 could also provide regional attenuation of stage downstream of the project area due to more floodway storage from widening of the floodplain, which would be accomplished through removing the existing "J" levee and constructing the setback levee.

This alternative plan would provide benefits because it would provide protection from flooding to the community and would reduce stages in the floodplains of the region. Increases in water surface elevation would either occur in areas intended to be exposed to flooding (between the existing "J" levee and the setback levee) or would be contained in the river channel and would not constitute an adverse hydraulic effect.

Combined Alternative 5

Combined Alternative 5 would have similar effects on river hydraulics as Combined Alternative 1.

Combined Alternative 6

Combined Alternative 6 would have similar effects on river hydraulics as Combined Alternative 1.

Mitigation Measures

Since there would be no effect on river hydraulics, no mitigation would be required.

5.3.3 Water Quality

This section identifies and evaluates potential water quality effects of the proposed alternatives and recommends any necessary measures to avoid or minimize these effects.

Basis of Significance. Adverse effects on water quality would be significant if an alternative plan would result in any of the following:

- Substantially degrade surface-water or groundwater quality such that it would violate criteria or objectives identified in the Central Valley Regional Water Quality Control Board (RWQCB) basin plan or otherwise substantially degrade water quality to the detriment of beneficial uses;
- Substantially deplete groundwater supplies or interfere with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of local groundwater table level;
- Substantially increase sediment in the Sacramento River;
- Substantially alter water temperatures in the Sacramento River.

Effects

No-Action Alternative

The levee along the project area would likely continue to deteriorate and have the potential for failure. If this occurs, flood fight activities may occur, which could result in the placement of rock revetment. Rock revetment creates a "hard spot" in the levee and can result in deterioration of the adjoining earthen levee, resulting in increased sediment in the river. The rock revetment could also result in increased water temperatures due to lack of shaded riverine habitat.

The wastewater treatment facility would continue to be protected by a private levee, and the integrity of those levees is unknown. The facility would continue to be at risk of flooding. The Hamilton City drainage canal would remain in place under this alternative.

No areas within the study would be converted from permeable material to non-permeable material. Therefore, there would be no effect on groundwater supplies under this alternative. Pumping for irrigation would continue.

Combined Alternative 1

Construction of Combined Alternative 1 could have temporary adverse effects on water quality. Operation of heavy equipment, exposure of bare soil areas during storms, and removal of the existing levee could increase erosion, turbidity, and sedimentation in the Sacramento River. This effect is potentially a significant effect. However this effect would be short term, and once the area stabilizes, the turbidity would discontinue. The turbidity that does occur would be a naturally occurring process and would provide sediment to an area in the river that is in need of the deposits. The Corps would continue to coordinate with the RWQCB and would implement best management practices, as recommended by the RWQCB, to avoid or minimize the amount of sediment entering the river during construction. The new levee alignment would be constructed outside the waterway so there would be little risk of sediment entering the Sacramento River during construction. Active restoration would occur under this alternative to prevent erosion of the new levee.

This alternative would have several beneficial effects on water quality. Conversion of farmlands to native habitat would have a beneficial effect on water quality of surface runoff due to increased vegetative cover, reduced tillage, reduced use of well water, and reduced application of agricultural chemicals. In addition, Combined Alternative 1 would decrease the

risk of flooding to the wastewater treatment facility by construction of a setback levee between the facility and the Sacramento River. This levee would reduce the risk of sewage spills during flood events.

No areas within the study area would be converted from permeable material to non-permeable material. Therefore, there would be no adverse effect on groundwater supplies under this alternative. Instead, the alternative would increase the recharge of groundwater supplies by increasing the area of temporary floodwater storage on the floodplain.

The only activity associated with Combined Alternative 1 that would affect wetlands or other waters of the United States is the placement of rock at Gianella Bridge. Up to 100 feet of rock and/or grouted rock and/or a concrete lining would be placed under the Gianella Bridge at Highway 32 abutment specifically to protect it from exposure to higher velocities resulting from passing higher flows. The remainder of the riprap would be placed on the setback levee or the road embankment. This activity would be covered for Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act under Nationwide Permit # 14 for Linear Transportation Projects. The setback levee would be located to avoid impacts to the wetlands associated with Dunning's Slough. A 404(b)(1) analysis has been written for the placement of rock on the existing bank at the bridge.

Combined Alternative 5

Combined Alternative 5 would have similar water quality effects as Combined Alternative 1, but under this alternative, the water treatment facility would remain in the current location on the waterside of the levee. The facility would continue to be at risk of flooding. Flooding of the facility would cause a risk to public health and safety.

Combined Alternative 5 also includes building the setback levee through the existing Hamilton City Irrigation Ditch that is considered a seasonal wetland habitat. This irrigation ditch is not considered a jurisdictional wetland and therefore not subject to a Section 404 permit.

Combined Alternative 6

Combined Alternative 6 would have similar water quality effects as Combined Alternative 1. In addition, the wastewater treatment facility would remain in its current location under this alternative. However, the new levee would be constructed between the facility and the Sacramento River. Although the facility has not flooded in the past, this alternative would decrease the risk of flooding due to the new higher more stable levee. No relocation of the Hamilton City drainage canal would be needed. This alternative would have beneficial effects on water quality and groundwater recharge.

Mitigation Measures

Under all alternatives, there is potential for significant short-term construction impacts. The following best management practices would be implemented to reduce potential water quality effects to less than significant. Prior to the start of construction, a National Pollution Discharge Elimination System (NPDES) general permit for construction activities would be acquired from the Central Valley RWQCB, and a storm water pollution prevention plan (SWPPP) would be developed per the Guidelines of the general permit. The SWPPP would list all best management practices to be implemented during construction

activities for control of erosion, siltation, and any other pollutants that could potentially enter storm water or surface waters in the project area.

Best management practices would include, but not be limited to the following:

- Preserve all existing vegetation where possible.
- The contractor would prepare an erosion and sediment control plan incorporating a site drainage plan consistent with the RWQCB policies.
- All soils disturbed by construction would be stabilized and reseeded with native grasses after construction is complete.

Under Combined Alternative 5, a 45-acre seasonal wetland would be created on the waterside of the new setback levee, just east of its current location. This wetland creation would be considered mitigation for filling the irrigation ditch. Construction of the levee and wetland would occur during the dry season when the irrigation ditch would not be needed for runoff, and therefore effects to water quality from this construction would be mitigated to a less-than-significant effect.

5.3.4 Air Quality

Basis of Significance. An alternative is considered to have potentially significant effects on air quality if proposed construction or operational activities would result in emissions that exceed local emission thresholds or exceed emission thresholds that trigger a conformity analysis under Section 176(c) of the 1990 Clean Air Act Amendments.

Effects

No-Action Alternative

The area occasionally exceeds State levels for ozone. The area occasionally exceeds both Federal and State levels for particulate matter (PM₁₀). Present trends in air quality can reasonably be expected to continue if no-action is taken, and pollutant levels would continue to occasionally exceed Federal and State standards.

Combined Alternative 1

Construction of the setback levee and restoration activities that utilize farming equipment would result in temporary degradation of air quality. There would be a temporary local increase in the amount of fugitive dust from construction and restoration activities and an increase in emissions from the operation of construction equipment. The proposed project would generate emissions of carbon monoxide, ozone precursors, and PM₁₀ from construction of the authorized project features and increased project-related traffic.

Construction of the project features would result in pollution emissions from trucks hauling material to and from the site, and from construction equipment operating on the sites. Construction would also result in dust emissions from hauling and handling of soil and rock materials, wind erosion of disturbed ground, and any vehicle travel on unpaved roads. Construction of the project features could also cause a substantial quantity of dust to be emitted into the atmosphere. A major fraction of the dust would settle out, on, and immediately adjacent to the project area; while a minor fraction would contribute to the area's ambient PM₁₀ level. Truck and construction equipment exhaust would also contribute

to the region's ozone and PM10 levels and to carbon monoxide levels in the immediate vicinity. Emission rates and corresponding emission thresholds are shown in Table 5-2.

TABLE 5-2. COMPARISON OF EMISSION THRESHOLDS AND PROJECT EMISSIONS

Pollutant¹	Glenn Co. Threshold	Maximum Project Emissions
NO _x	25 lbs/day	399 lbs/day
ROG	25 lbs/day	17 lbs/day
PM ₁₀	80 lbs/day	23 lbs/day
CO	500 lbs/day	63 lbs/day
SO _x	80 lbs/day	23 lbs/day
Pollutant	EPA Threshold	Project Emissions
NO _x	100 tons/year	6 tons/year
ROG	100 tons/year	0.5 tons/year
PM ₁₀	100 tons/year	0.3 tons/year
CO	100 tons/year	1.9 tons/year
SO _x	100 tons/year	0.3 tons/year

¹NO_x = nitrogen oxides, ROG = reactive organic gases, PM₁₀ = particulate matter, CO = carbon monoxide, SO_x = sulfur oxides

Construction related emissions would exceed the local daily threshold for nitrogen oxides only. This short-term construction effect is considered a significant impact. Because construction of the project features would be a temporary source of air pollutants, construction-related emissions that exceed local thresholds can be mitigated to less than significant if construction is accomplished using best available control technology to reduce pollutant emissions.

Construction related emissions, which are far in excess of any operational emissions, would not exceed any of the EPA annual thresholds. Therefore, a conformity determination is not required, and these emissions are also not considered to be significant on an annual basis.

Combined Alternative 1 would have long-term beneficial air quality effects with the restoration of 1,300 acres of habitat, which would contribute to an improvement in air quality. In addition, with the conversion of the agricultural land there would be a resultant reduction of the amount of agriculture related emissions, as agricultural equipment would no longer be utilized.

Combined Alternative 5

Combined Alternative 5 would have similar air quality effects as Combined Alternative 1 with a slight reduction in construction time due to a shorter levee length from 5.5 to 5.3 miles and an increase of 1,600 acres of habitat. In addition, with the conversion of the

agricultural land there would be beneficial affects due to the resultant reduction of the amount of agriculture related emissions, as agricultural equipment is no longer utilized.

Combined Alternative 6

Combined Alternative 6 would have similar air quality effects as Combined Alternative 1. The same construction equipment would be needed for both alternatives and a slightly longer time frame for construction would be involved due to the increase in levee length from 5.5 miles long to 6.8 miles long and a larger restoration area from 1,300 acres to 1,500 acres. The same area would be restored for both alternatives.

Combined Alternative 6 would have beneficial air quality effects with the restoration of 1,500 acres of habitat and the reduction of the amount of agriculture related emissions.

Mitigation Measures

Since there would be some potential significant short-term effects to air quality, mitigation would be required. Best available control technology to reduce pollutant emissions shall be used to reduce potential air quality effects to a less-than-significant level; this control technology includes the following measures:

- Construction equipment operating on the site and trucks used for hauling material to and from the site shall be properly equipped with required emission control devices operating properly to minimize exhaust pollutant emissions.
- Trucks hauling construction materials shall be covered or the material shall be sufficiently wetted to eliminate visible dust emissions.
- No burning of waste material or cleared vegetation shall occur.
- Watering shall be used to minimize dust emissions from any unpaved haul road and levee road. Watering shall be performed as needed to eliminate visible dust emissions from any unsurfaced haul roads and levee roads.
- Haul-truck speed shall be limited to a maximum of 10 mph on levee roads adjacent to residences, and 15 mph on other unpaved roads to minimize dust emissions and road throw.
- All disturbed soil areas or constructed soil bodies shall be wetted sufficiently to keep them damp at all times during construction hours to eliminate visible dust emissions.

These measures would substantially reduce pollutant emissions from the construction site. Through the use of the reduction measures and the temporary nature of the emissions, the air quality effects associated with the construction are considered to be less than significant.

The long-term effects of the project would be beneficial. Therefore, no mitigation would be required.

5.3.5 Vegetation

Basis of Significance. An alternative would be considered to have a significant effect on vegetation if it would result in any loss or degradation of native vegetation.

Four broad categories of habitat types are planned for restoration: Riparian, Savannah, Scrub, and Grassland. These categories were developed for the purposes of evaluating the habitat outputs of the alternatives for this feasibility study. For the actual planting design, these broad habitat categories would be further broken down into subcategories to develop habitat types suited for their specific locations, soil, flooding, and depth to groundwater conditions. Figures 5-1 through 5-4 show examples of habitat types.



Figure 5-1: Riparian Habitat¹ (Photo: Corps)

¹ A dense canopy cover dominated by a high diversity of tree species that grows in areas of frequent flood inundation (at least every 2 years). An assortment of shrubs, vines and grasses form the understory in areas of deeper wetter soils.



Figure 5-2: Savanna Habitat²(Photo: TNC)



Figure 5-3: Grassland Habitat³ (Photo: TNC)

² An intermittent canopy cover primarily consisting of trees and large shrubs with native grasses found in upland areas within the 5-year floodplain.

³ An open area of native grasses and forbs that would be planted in upland areas adjacent to the setback levee where there is frequent flooding and coarse soils.



Figure 5-4: Scrub Habitat⁴ (Photo: SRCAF)

Effects

No-Action Alternative

No change in vegetation is assumed on lands currently within the study area except for lands currently owned by DFG or USFWS. Vegetation on the levee would be maintained as it is today. The grassland and orchard habitats on the landside of the levee, and the riparian vegetation on the waterside of the levee, are not expected to change significantly. Maintenance practices and programs are expected to remain as they are today. Some existing grassland may be converted to orchard. Orchards in the project area that are young and just entering their prime production period are expected to remain in production for many years. Older orchards are likely to be replanted. Orchards are expected to be lost or removed from production in areas subject to erosion.

Combined Alternative 1

The long-term benefits of habitat restoration would result in approximately 1,300 acres of native habitat being restored. Acreages of restored habitat for Combined Alternative 1 are displayed in Table 5-3. The restored ecosystem would be dependent on the actively meandering river channel to sustain the sequence of plant community succession. However, the realigned levee would have no effect on the rate of river migration. The areas closest to the river's edge would be vegetated with riparian and willow and the lands further back from the river would be planted in savannah and grassland. The newly reconnected

⁴ This community would either be willow scrub, a very dense pioneer riparian community found on depositional areas along the river's edge or an upland scrub habitat of medium sized shrubs. This community is usually found within the 2 ½ -year floodplain with shallower soils.

overbank floodplain would be inundated during lower-level flood events. This frequent inundation would assist in the establishment of riparian vegetation in these areas.

Establishment of native vegetation within the setback levees would contribute to a vegetative corridor along the river. In the immediate area, Sacramento River Partners and the DFG have restored approximately 235 acres on the Pine Creek Unit. In the region, development of riparian vegetation in the Hamilton City area would contribute to the riparian restoration work by the Sacramento River Conservation Area Forum, Central Valley Project Improvement Act, Central Valley Habitat Joint Venture, Sacramento River National Wildlife Refuge, Department of Fish and Game’s Sacramento River Wildlife Area, California Riparian Habitat Conservation Program, and Riparian Habitat Joint Venture (Partners in Flight).

Construction activities would result in some short-term effects on native habitat. Annual grassland and riparian habitat are present on the existing levee slopes. Some of these areas would be affected by excavation of material for the dual purpose of removing the levee and obtaining borrow material for constructing the new levee. Levee sections with existing riparian vegetation would be avoided during these activities. Additional borrow material would be obtained from the GCID dredged spoil pile, which lies between the Glenn-Colusa Canal and County Road 203/Highway 45, from the fish screen south along the canal. The loss of vegetation due to the excavation of material from this spoil pile is negligible since only very sparse ruderal vegetation exists. There would also be a loss of vegetation within the new levee alignment, which is currently in orchard. These losses and the compensation for them (i.e., planting the excavated area of the removed levee and the new levee with native grasses) have been accounted for in the overall benefit evaluation.

**TABLE 5-3: COMPARISON OF HABITAT ACREAGES -
FUTURE WITHOUT-PROJECT CONDITION AND COMBINED ALTERNATIVE 1**

Habitat Type	Without-Project (Acres)	Combined Alternative 1 (Acres)	Net Restored Habitat (Acres)
Riparian	97	956	859
Grassland	84	146	62
Savannah	0	140	140
Scrub	0	227	227
Agriculture	1,288	0	-
Total	1,469	1,469	1,288¹

¹Elsewhere in this document this acreage has been rounded to 1,300 acres.

Combined Alternative 5

Approximately 1,600 acres of native habitat would be restored. Forty-five acres of wetland would be created for mitigation purposes and are not considered a project benefit. These acres are not included in the total acres restored for the HEP analysis. Acreages of restored habitat for Combined Alternative 5 are displayed in Table 5-4. The restored ecosystem would be dependent on the actively flooding floodplain to sustain the sequence of plant community succession. However, the realigned levee would have no effect on the rate of river migration. The areas closest to the rivers edge would be vegetated with riparian and scrub and the lands further back from the river would be planted in savannah and grassland.

The newly reconnected overbank floodplain would be inundated during lower-level flood events. This frequent inundation would assist in the establishment of riparian vegetation in these areas.

Establishment of native vegetation within the setback levees would contribute to a vegetative corridor along the river. In the immediate area, Sacramento River Partners and the CA Department of Fish and Game have restored approximately 235 acres on the Pine Creek Unit. In addition, the USFWS is in the process of restoring their 681-acre Kaiser property immediately south of the study area. In the region, development of riparian vegetation in the Hamilton City area would contribute to the riparian restoration work by the Sacramento River Conservation Area Forum, Central Valley Project Improvement Act, Central Valley Habitat Joint Venture, Sacramento River National Wildlife Refuge, Department of Fish and Game's Sacramento River Wildlife Area, California Riparian Habitat Conservation Program, and Riparian Habitat Joint Venture (Partners in Flight).

The existing irrigation ditch, which is considered a seasonal wetland habitat, would be filled during construction of the setback levee, and a new wetland area would be created in an adjacent area on the waterside of the setback levee at a ratio of 3:1. This is considered to be a significant effect.

Construction activities would result in some short-term effects on native habitat. Annual grassland and riparian habitat are present on the existing levee slopes. Some of these areas would be affected by excavation of material for the dual purpose of removing the levee and obtaining borrow material for constructing the new levee. Levee sections with existing riparian vegetation would be avoided during these activities. Additional borrow material would be obtained from the GCID dredged spoil pile, which lies between the Glenn-Colusa Canal and County Road 203/Highway 45, from the fish screen south along the canal. The loss of vegetation due to the excavation of material from this spoil pile is negligible since only very sparse ruderal vegetation exists. There would also be a loss of vegetation within the new levee alignment, which is currently in orchard. These losses and the compensation for them (i.e., planting the excavated area of the removed levee and the new levee with native grasses) have been accounted for in the overall benefit evaluation.

**TABLE 5-4: COMPARISON OF HABITAT ACREAGES -
FUTURE WITHOUT-PROJECT CONDITION AND COMBINED ALTERNATIVE 5**

Habitat Type	Without-Project (Acres)	Combined Alternative 5 (Acres)	Net Restored Habitat (Acres)
Riparian	97	1,161	1,064
Grassland	85	163	78
Savannah	0	154	154
Scrub	0	289	289
Agriculture	1,630	0	-
Total	1,812	1,767	1,585¹

¹Elsewhere in this document this acreage has been rounded to 1,600 acres.

Combined Alternative 6

Combined Alternative 6 would have similar but slightly greater effects than Combined Alternative 1 due to the larger restoration area from 1,300 acres to 1,500 acres. Approximately 1,500 acres of native habitat would be restored. Acreages of restored habitat for Combined Alternative 6 are displayed in Table 5-5.

Construction activities would result in some short-term effects on native habitat. Annual grassland and riparian habitat are present on the existing levee slopes. Some of these areas would be affected by excavation of material for the dual purpose of removing the levee and obtaining borrow material for constructing the new levee. Levee sections with existing riparian vegetation would be avoided during these activities. Additional borrow material would be obtained from the GCID dredged spoil pile, which lies between the Glenn-Colusa Canal and County Road 203/Highway 45, from the fish screen south along the canal. The loss of vegetation due to the excavation of material from this spoil pile is negligible since only very sparse ruderal vegetation exists. There would also be a loss of vegetation within the new levee alignment, which is currently in orchard. These losses and the compensation for them (i.e., planting the excavated area of the removed levee and the new levee with native grasses) have been accounted for in the overall benefit evaluation.

**TABLE 5-5: COMPARISON OF HABITAT ACREAGES -
FUTURE WITHOUT-PROJECT CONDITION AND COMBINED ALTERNATIVE 6**

Habitat Type	Without-Project (Acres)	Combined Alternative 6 (Acres)	Net Restored Habitat (Acres)
Riparian	97	1,094	997
Grassland	85	155	70
Savannah	0	148	148
Scrub	0	261	261
Agriculture	1,476	0	-
Total	1,658	1,658	1,476¹

¹Elsewhere in this document this acreage has been rounded to 1,500 acres.

Mitigation Measures

The long-term effects to vegetation would be beneficial for all of the evaluated alternatives. The only exception is that there is an in-kind loss of seasonal wetlands for Combined Alternative 5. For this alternative, 45 acres of seasonal wetland habitat would be created within the restoration area waterside of the new setback levee in Zone F (see Figure 3-1) to mitigate in-kind for the loss of 15 acres of seasonal wetland. This mitigation would reduce the impact to less than significant.

5.3.6 Wildlife

Basis of Significance. Adverse effects on wildlife were considered significant if an alternative would result in a substantial net loss of important wildlife habitat over the period of analysis as compared to the existing conditions.

Effects of the proposed alternatives on the study area were analyzed during coordination with the USFWS under the Federal Fish and Wildlife Coordination Act. A Habitat Evaluation Procedures (HEP) analysis was conducted for the entire study area to determine the effects of the proposed alternatives on biological resources. This section includes a summary of the HEP analysis. A detailed discussion of the HEP analysis is included in the Draft Coordination Act Report, which can be found in Appendix B.

The HEP analysis combines acreage of habitats with measures of habitat value or quality of the habitat for wildlife at baseline or current conditions in the project area and compares that value with the estimated value at various points in time throughout the period of analysis (50 years). Quantifying habitat loss or gain only in terms of a loss or increase of acres does not reflect the varying quality of habitats to the species that inhabit them. The HEP analysis is based on the assumption that the value of habitat to a selected species or group of species can be described by models, which use variables that represent habitat suitability for wildlife. The models produce a Habitat Suitability Index, which is multiplied by the area of available habitat to obtain habitat units (HU's). The HU's and Average Annual Habitat Units (AAHU's) over the life of the project are then used in the comparison of the benefits of the various alternatives.

The HEP models that were used for this evaluation of project outputs were developed by the USFWS and include a red-tailed hawk model, a riparian forest model, and a scrub-shrub model. The red tail hawk model was applied to the savannah, grassland, and orchard habitats. The biggest adjustment made to the models was to include a floodplain variable, which considered plant germination, shaded riverine aquatic (SRA) components, large woody debris (LWD), and natural banks when the models were applied to the riparian and scrub habitat. These habitats account for approximately 91 percent of the potentially restored area and the floodplain variable better reflected the improved function of restoring flooding to the floodplain on these two habitat types.

Effects

No-Action Alternative

Since no change in vegetation is anticipated, no significant change in wildlife is anticipated with the No-Action Alternative. Population fluctuations of individual species would continue.

Combined Alternative 1

As discussed in Chapter 4, numerous wildlife species occupy the vegetative communities within the study area. Species present within the study area may experience temporary disturbance and/or displacement due to construction noise and activity for the duration of the project. Temporary effects to wildlife species that inhabit the existing vegetation would occur during construction due to the noise and vibration from the equipment and temporary habitat loss. Additionally, any displaced species would be expected to return to the area once construction is completed.

The quantity and variety of species is also expected to increase once the restored areas become established. The composition, abundance, and distribution of wildlife resources within the project area are directly related to the available habitat. Thus, an increase in vegetation along the river within the restored area would provide additional

habitat for species improving the biological diversity of surrounding areas. In addition, the restoration area can serve as a pathway for movement between habitats along the riparian corridor, which is being expanded by several ecosystem restoration projects in the region.

Amphibian habitat along the rivers may be more favorable due to an increase in the availability of pond-like areas, enhanced growth and vigor of riparian scrub, cottonwoods, and associated herbaceous vegetation due to the widening of the river channel. The increase in habitat provides more living space, breeding habitat, shade, cover, and prey substrate for young and adult amphibians. Reptiles would also benefit from the improved cover and prey base.

Populations of raptors and other species dependent on mature cottonwood trees area expected to be temporarily utilize other areas during construction, however, once construction has ended raptor species are expected to return. As riparian and savannah habitats mature, raptors would ultimately benefit from these habitats. As riparian and savannah habitats mature, raptors would ultimately benefit from these habitats. Populations of songbirds and cavity nesting species would likely be higher due to better growth and vigor of riparian vegetation, increases in the amount of scrub-shrub habitat, and increases in riparian regeneration. These changes in vegetation are expected to provide more nesting and foraging habitat for many species of birds, especially migratory songbirds. A greater abundance of prey may improve reproductive success, which can result in higher populations of birds along the rivers.

By making the habitat in this area more supportive of migratory species, this project would bolster breeding and wintering populations in areas physically removed, but ecologically linked to the Sacramento River. Examples include the habitat benefits to migratory neotropical migratory birds and waterfowl. Breeding and wintering habitat would be increased for double-crested cormorant, western grebe, Clark's grebe, pied-billed grebe, horned grebe, cinnamon teal, canvasback, eared grebe, American coot, and belted kingfisher. There could also be benefits to greater white-fronted goose, redhead, red-necked duck, and greater scarp.

Riparian habitat generation would also benefit local populations of mammals. Mature trees that provide better cover and foraging habitat would benefit the raccoon, beaver, weasel, skunk, and bat species.

Outputs, measured in AAHU's, from the HEP analysis for each of the Combined Alternative Plans is shown in Table 5-6. Because each of the proposed alternatives would result in an increase in both quality and quantity of habitat, there is also a net gain in AAHU's as compared to the without-project conditions. The output for Combined Alternative 1 is 783 AAHU's.

Combined Alternative 5

Combined Alternative 5 would have similar effects as Combined Alternative 1 but with shorter temporary adverse effects to wildlife species due to the shorter construction time with a shorter levee length from 5.5 miles to 5.3 miles. The output from the HEP analysis for Combined Alternative 5 is 936 AAHU's (Table 5-6).

TABLE 5-6: COMPARISON OF NET OUTPUTS (AAHU'S) FOR ALTERNATIVE PLANS

Habitat Type	Combined Alternative 1	Combined Alternative 5	Combined Alternative 6
Riparian	844	1,028	965
Grassland	63	80	72
Savannah	137	150	144
Scrub	219	278	252
Agriculture	-480	-600	-546
Total	783	936	888

Combined Alternative 6

Combined Alternative 6 would have similar effects as Combined Alternative 1 with but with more temporary adverse effects to wildlife species due to the longer construction time with a longer levee length. In addition, Combined Alternative 6 would include an increase in the beneficial effects to wildlife species due to an increase in the restoration area to 1,500 acres. The output from the HEP analysis for Combined Alternative 6 is 888 AAHU's (Table 5-6).

Mitigation Measures

Since the long-term effects to Wildlife would be beneficial, no mitigation would be required.

5.3.7 Fisheries and Aquatic Resources

Basis of Significance. Adverse effects on fisheries were considered significant if an alternative would result in a substantial net loss of important fisheries habitat or Essential Fisheries Habitat (EFH) over the period of analysis as compared to the existing conditions.

Effects

No-Action Alternative

Ongoing ecosystem restoration efforts of programs such as CALFED, CVPIA, and others may improve the quantity and value of fishery and aquatic resources. Most restoration work for fisheries can be expected to occur upstream of the study area as that is where the fisheries spawning habitat occurs.

Combined Alternative 1

There is also the potential need to place additional rock adjacent to the existing rock at the bridge abutment. NOAA Fisheries has agreed that this is not likely to affect fisheries and aquatic resources as long as the placement occurs outside fisheries occurrence windows.

Setting back the levee at Hamilton City and planting riparian trees would allow for the future input of LWD into the river, which would benefit fishes over the long term and ultimately contribute to shaded riverine aquatic vegetation (SRA). Overhanging or fallen

trees or branches on banks are important to the survival of many fish species. It moderates water temperatures, which is an important factor for all life stages of salmonid fishes as mortality can occur when temperatures are too high. River productivity is increased at all trophic levels by the organic materials and energy input from terrestrial vegetation. This vegetation provides food and habitat that in turn serves as food for numerous bird species and several fish species such as chinook salmon and steelhead. It also provides shaded escape cover for fish. The setback would contribute to the restoration of riverine function and therefore habitat forming processes that would result in beneficial effects to both important fish habitat and EFH. The restoration is consistent with other restoration programs in the area and regional restoration plans (SRCAF, CALFED) that would benefit habitat-forming processes by contributing to a larger scale effort for fisheries restoration. All the newly floodable area would be considered such habitat upon project implementation.

Restoring complex riparian habitat along the Sacramento River would improve habitat for fish and wildlife. Fish benefit from complex riparian areas that become flooded at high flows or that slow floodwaters down and provide refugia for young and juvenile fish (Sommer et al., 1997). The ecological benefits of our restoration activities extend far beyond the reaches of the study area. For many species, the main stem of the Sacramento River is a migratory pathway.

By making the habitat in this area more supportive of migratory species, this alternative would bolster breeding and wintering populations in areas physically removed, but ecologically linked to the Sacramento River. Examples include the habitat benefits to neotropical migratory birds and native anadromous fish. Additionally, improvements in water quality as a result of restoration efforts have beneficial effects all the way down the Sacramento River into the Bay-Delta.

Combined Alternative 5

There is also the potential need to place additional rock adjacent to the existing rock at the bridge abutment. NOAA Fisheries has agreed that this is not likely to affect fisheries and aquatic resources as long as the placement occurs outside fisheries occurrence windows.

Combined Alternative 5 would have similar effects as Combined Alternative 1 with an increase in the beneficial effects to fisheries and aquatic resources due to an increase in the restoration area to 1,600 acres. This Combined Alternative would contribute to the supply of SRA and LWD available in the future and would benefit both important fish habitat and EFH. All the newly floodable area would be considered EFH habitat upon project implementation.

Combined Alternative 6

There is also the potential need to place additional rock adjacent to the existing rock at the bridge abutment. NOAA Fisheries has agreed that this is not likely to affect fisheries and aquatic resources as long as the placement occurs outside fisheries occurrence windows.

Combined Alternative 6 would have similar effects as Combined Alternative 1 with an increase in the beneficial effects to fisheries and aquatic resources due to an increase in the restoration area to 1,500 acres. This Combined Alternative would contribute to the supply of SRA and LWD available in the future and would benefit both important fish habitat and EFH. All the newly floodable area would be considered EFH habitat upon project implementation.

Mitigation Measures

Any necessary placement of rock at the bridge abutment would occur outside fisheries occurrence windows and would therefore not likely affect fisheries. Since the long-term effects to Fisheries and Aquatic Resources would be beneficial, no mitigation would be required.

5.3.8 Special-Status Species

Basis of Significance. An alternative would be considered to have a significant effect on special status species if it would result in the take of a Federally or State-listed threatened or endangered species, adversely affect designated critical habitat, or substantially affect any other special status species, including degradation of its habitat. Table 4-5 in Chapter 4 summarizes the special status species, including the information on habitat requirements, distribution, and possible occurrence in the project area. Based on this information, each species listed was evaluated for its potential to occur in the study area and its likelihood of being adversely effected by the project. The following species including the VELB, central valley spring-run chinook salmon, central valley steelhead, winter-run chinook salmon and its critical habitat, bank swallow, Swainson's hawk, and western yellow-billed cuckoo have the potential to occur in the project area, and the potential effects of the alternatives are discussed.

Valley Elderberry Longhorn Beetle (VELB)

Effects

No-Action Alternative

Habitat for VELB in the project area is expected to remain similar to existing conditions under the future without-project conditions scenario. Future urban development effects on special-status species could be reduced by compliance with requirements in the Federal and State Endangered Species Act and local ordinances designed to conserve special status species.

Combined Alternative 1

Combined Alternative 1 could potentially have temporary effects to the VELB during construction activities. However, these potential effects will be avoided. The existing levee would be removed and the new levee constructed in a manner that would avoid effects to elderberry plants. During construction, vegetation (e.g., trees and shrubs) would be fenced and flagged for avoidance. No shrubs are expected to be removed as a part of this alternative. With the measures taken to avoid effects to VELB, potential adverse effects during construction would not be significant.

New areas of riparian woodland and savannah would be created within the restoration area. Within 10 percent of each of these habitat types, elderberry shrubs would be planted at a density of 1-5 plants for every 1,800 square feet depending on soil conditions. For Combined Alternative 1, a minimum of 2,400 elderberry bushes would be planted. Therefore, the long-term effects on VELB would be beneficial.

Future OMRR&R activities under the project may require effects to elderberry plants that were planted or otherwise established by the project's restoration activities. These activities are described in the project's "Elderberry Planting and Monitoring Plan for the

Valley Elderberry Longhorn Beetle” (Appendix B). The lead agencies for the project have obtained a take permit for these future activities. The biological assessment and corresponding Biological Opinion addressing all special status species is included in Appendix B.

Combined Alternative 5

Combined Alternative 5 would have similar effects as Combined Alternative 1 with an increase in the potential total of elderberry bushes planted. For Combined Alternative 5, a minimum of 2,760 elderberry bushes would be planted.

Combined Alternative 6

Combined Alternative 6 would have similar effects as Combined Alternative 5 with an increase in the potential total of elderberry bushes planted. For Combined Alternative 6, a minimum of 2,760 elderberry bushes would be planted.

Conservation Measures

The following conservation measures will be implemented to provide protection for elderberry shrubs planted during restoration activities in the project area:

1. For the purposes of flood fighting (i.e., placement of flood-fighting material, such as rock), it is permissible to remove any elderberry shrub within the proposed project area. The proposed management for the project includes maintaining the levee and a 300-foot buffer adjacent to the waterside of the levee in a grassland vegetation that is free of elderberry shrubs. Access to this area during flood-fighting would necessarily be via the landside of the levee, which would not include any elderberry plantings. Therefore, any flood-fighting activities on the levee or within the 300-foot buffer that would affect elderberry shrubs that may voluntarily establish within these areas would not require implementation of measures to protect elderberry shrubs. However, for any Corps flood-fighting activities affecting areas on the waterside of the buffer area, a Service-approved biologist familiar with elderberry shrubs shall join the flood-fighting efforts to provide assistance. Access routes, staging areas, and all project activities should be chosen in a manner that will cause the least amount of damage to beetle habitat without adversely affecting the flood-fighting efforts. Removal of elderberry shrubs should be limited to the minimum necessary to achieve the project goal. The biologist will have the authority to coordinate with the onsite engineer to ensure that appropriate consideration is given to avoiding effects to elderberry shrubs. State and local agencies should make similar efforts when flood-fighting without Corps assistance.
2. During Corps emergency flood-fighting activities in the project area on the waterside of the buffer area, a reasonable effort will be made to clearly demarcate access routes and work boundaries. As soon as possible after the initiation of flood-fighting, a Service-approved biologist shall identify sensitive habitat that could be avoided without affecting flood-fighting activities and place adequate high visibility flagging around the avoidance areas to prevent unnecessary encroachment of construction equipment and personnel into beetle habitat during project work activities. Such flagging shall be inspected and maintained daily by a Service-approved biologist until completion of the project, at which time the flagging shall be removed. The Service-

- approved biologist shall have the authority to recommend alternatives to any action that might result in effects to the avoidance areas. If the Service-approved biologist exercises this authority, the Service shall be notified within one calendar day. State and local agencies should make similar efforts when flood-fighting without Corps assistance.
3. For the purposes of routine maintenance activities, which will be described in an O&M Manual (e.g., levee inspections, vegetation removal from the levee and a 300-foot buffer zone adjacent to the levee, or clearing vegetation within the restoration area to maintain hydraulic capacity of the floodplain), it is permissible to remove any elderberry shrub. If the routine maintenance activity will include vegetation removal, a Service-approved biologist familiar with elderberry shrubs shall be onsite during the activities to ensure that elderberry plants outside of the maintenance area are not disturbed.
 4. During routine maintenance activities, elderberry shrubs within the maintenance activity project area that are not required to be removed will be clearly demarcated with adequate high visibility flagging by the Service-approved biologist. Such flagging shall be inspected and maintained daily by a Service-approved biologist until completion of the project, at which time the flagging shall be removed. The Service-approved biologist shall have the authority to recommend alternatives to any action that might result in effects to the avoidance areas. If the Service-approved biologist exercises this authority, the Service shall be notified within one calendar day.
 5. Prior to maintenance activities and during Corps flood-fighting activities, all workers shall be informed of the importance of avoiding effects to elderberry shrubs. Workers shall be provided with information on their responsibilities with regard to listed-species and an overview of the life-history of the species and description of the restoration area.
 6. After Corps flood-fighting activities take place in areas on the waterside of the buffer area, a report prepared by the monitoring biologist(s) shall be forwarded to the Chief of the Endangered Species Division (Central Valley) at the Sacramento Fish and Wildlife Office within 60 calendar days of the completion of the project. This report shall detail: (1) dates that flood-fighting activities occurred; (2) known project effects on federally-listed species, if any; (3) occurrences of incidental take of Federally-listed species, if any; and (4) other pertinent information. State and local agencies should make similar efforts when flood-fighting without Corps assistance.
 7. After Corps flood-fighting activities take place on the waterside of the buffer area, the Corps shall revegetate all areas where VELB habitat was removed or similarly affected within the proposed project area with the native riparian species used in the original restoration. Replacement will be at a ratio of 1:1 for effects to VELB habitat in the project area. State and local agencies should make similar efforts when flood-fighting without Corps assistance.
 8. During maintenance activities, all fueling and maintenance of vehicles and other equipment, stockpiling of construction materials, and storage of portable equipment,

vehicles and supplies, including chemicals, shall be restricted to designated staging areas, which shall be located at least 250 feet from any riparian habitat. The agency responsible for O&M shall ensure that all reasonable measures are taken to avoid contamination of habitat during such operations. All workers shall be informed of the importance of preventing spills and appropriate measures to take should a spill occur. Any spills of hazardous materials shall be cleaned up immediately. Such spills shall be reported in O&M activities reports.

Mitigation Measures

Since the project would avoid short-term construction effects, and long-term effects to the VELB would be beneficial, no mitigation would be required. However, elderberry shrub plantings would be included in the planting plan, which, together with implementation of the conservation measures, would benefit the VELB.

Special Status Anadromous Fish

This section includes discussion of potential effects to the special status anadromous fish species that occur within the project area. These species include Central Valley spring-run chinook salmon, Central Valley steelhead, and winter-run chinook salmon and its critical habitat.

Effects

No-Action Alternative

Habitat for anadromous fish in the project area is expected to remain similar to existing conditions under the future without-project conditions scenario. Future urban development effects on special-status species could be reduced by compliance with requirements in the Federal and State Endangered Species Act and local ordinances designed to conserve special status species.

Combined Alternative 1

Implementation of Combined Alternative 1 could result in short-term adverse effects on fish species present in the study area during construction. For example, orchard removal, infrastructure modification, and grading are construction activities that could result in minor temporary increases in sediment load to the river during a flood event. Increased input of sediment has the potential to increase turbidity, possibly reducing the feeding efficiency of juvenile and adult fish. But, because the Sacramento is typically a turbid system, additional sediment input resulting from project activity would be comparatively minimal, and would not have any noticeable effect relative to the overall condition of the river. Furthermore, sediment input from construction sites would occur only during storm events.

Longer-term effects to anadromous fish could result from the loss of habitat due to implementation of the project. Removal of the existing levee could affect small areas of important habitats such as SRA cover and riparian vegetation. The loss of trees could temporarily adversely affect fish by reducing the amount of shade and potential for instream woody debris. To avoid this loss, levee removal activities would avoid removal of riparian vegetation. Vegetation (e.g., trees and shrubs) would be fenced and flagged for avoidance. Construction would also be done in a manner to avoid in-water work. The exception would be for placement of 100 feet of rock riprap below the water surface to protect the Gianella

Bridge, which would also adversely affect instream habitat. By itself, this would be a significant adverse effect.

Removal of the existing levee would reestablish the natural connectivity between the river and its floodplain, which would greatly benefit anadromous fish by providing access to floodplain habitat. This improved access also increases the risk of fish becoming stranded as floodwaters recede. However, the net effect would be beneficial.

Under Combined Alternative 1, the conversion of agricultural lands to riparian areas would result in long-term beneficial effects on fish in the Sacramento River. In this alternative, 1,300 acres of agricultural land would be converted. This alternative would contribute complexity to the aquatic environment, providing cover, food and other habitat components for fish, including SRA and LWD.

Sacramento River, tributaries, distributaries, and related riparian zones from Keswick Dam downstream to and including San Francisco Bay are classified as critical habitat for the winter-run chinook salmon. From December through August, the winter-run chinook salmon migrates past the area upstream, where it spawns. From August to December, winter-run juveniles use the SRA cover and LWD in the river for feeding and to rest and escape from predators. This alternative would contribute to the sustainable creation of this habitat and would therefore benefit winter-run chinook salmon critical habitat.

Combined Alternative 5

Combined Alternative 5 would have similar effects as Combined Alternative 1. In this alternative 1,600 acres of agricultural land would be converted. Under Combined Alternative 5, the conversion of agricultural lands to riparian areas would result in long-term beneficial effects on fish in the Sacramento River.

Combined Alternative 5 would have similar effects to critical habitat for winter-run chinook salmon as Combined Alternative 1. This alternative would contribute to the sustainable creation of critical habitat components and would therefore benefit winter-run chinook salmon critical habitat.

Combined Alternative 6

Combined Alternative 6 would have similar effects as Combined Alternative 1. In this alternative 1,500 acres of agricultural land would be converted. Under Combined Alternative 6, the conversion of agricultural lands to riparian areas would result in long-term beneficial effects on fish in the Sacramento River.

Combined Alternative 5 would have similar effects to critical habitat for winter-run chinook salmon as Combined Alternative 1. This alternative would contribute to the sustainable creation of critical habitat components and would therefore benefit winter-run chinook salmon critical habitat.

Mitigation Measures

Potential short-term effects would require mitigation to minimize these effects. The implementation of best management practices as discussed under the Water Quality section, for sediment control would reduce the potential water quality effects to fisheries to less than significant. If construction is conducted that may affect the salmon, it would be conducted within appropriate work windows, approved either by the NMFS, USFWS, or RWQCB. Working at these times would minimize potential effects to these species.

Since the long-term effects to the Central Valley spring-run chinook salmon, Central Valley steelhead, and winter-run chinook salmon and its critical habitat would be beneficial, no other mitigation would be required.

Bank Swallow

Effects

No-Action Alternative

Habitat for bank swallow in the project area is expected to remain similar to existing conditions under the future without-project conditions scenario. Future urban development effects on special-status species could be reduced by compliance with requirements in the Federal and State Endangered Species Act and local ordinances designed to conserve special status species.

Combined Alternative 1

Earthmoving machinery during construction could disturb the bank swallow, through noise, vibration, and airborne dust, and the duration of such disturbance could be substantial. If such disturbance occurs during the nesting season for the bank swallow, mortality could occur if the adults leave the nest for prolonged periods of time. In addition, vibration from the machinery could cause the vertical banks with burrows to collapse.

Combined Alternative 1 would have no long-term adverse effects on the bank swallow.

Combined Alternative 5

Combined Alternative 5 would have similar effects as Combined Alternative 1.

Combined Alternative 6

Combined Alternative 6 would have similar effects as Combined Alternative 1.

Mitigation Measures

Measures to minimize the potential construction effects to bank swallows include: avoiding nesting periods of the species if present within the project area, performing a field survey (if applicable) prior to construction, and avoiding disturbance of nests during construction.

Since there would be no long-term effects to the bank swallow, no mitigation would be required.

Swainson's Hawk

Effects

No-Action Alternative

The projected conversion of some lands in the Sacramento Valley from production of rice or small grain crops to cotton could reduce waterfowl populations, thereby indirectly affecting potential prey for Swainson's hawks. Habitat for Swainson's hawk in the project area is expected to remain similar to existing conditions under the future without-project conditions scenario. Future urban development effects on special-status species could be

reduced by compliance with requirements in the Federal and State Endangered Species Act and local ordinances designed to conserve special status species.

Combined Alternative 1

Earthmoving machinery during construction could disturb the Swainson's hawk, through noise, vibration, and airborne dust, and the duration of such disturbance could be substantial. If such disturbance occurs during the nesting season for birds, mortality could occur if the adults leave the nest for prolonged periods of time.

Swainson's hawks may use riparian vegetation and oaks that occur on the existing levee to nest or perch. Levee removal activities could affect these trees. However, to avoid these potential effects, levee sections with existing riparian vegetation or large oaks would be avoided during excavation activities.

Foraging habitat for Swainson's hawk in the project area would be increased by implementation of Combined Alternative 1. New foraging habitat would be created through restoration of a total of 60 acres of grassland and 140 acres of savannah that may be utilized for foraging by the Swainson's hawk. These 200 acres would more than offset the loss of foraging habitat on approximately 90 acres of grain crops that would be converted to riparian. This alternative would provide an overall benefit to foraging habitat for the Swainson's hawk.

Combined Alternative 5

Combined Alternative 5 would have similar effects as Combined Alternative 1. Foraging habitat for Swainson's hawk in the project area would be increased by implementation of Combined Alternative 5. New foraging habitat would be created through restoration of a total of 80 acres of grassland and 150 acres of savannah that may be utilized for foraging by the Swainson's hawk. These 230 acres would more than offset the loss of foraging habitat on approximately 90 acres of grain crops that would be converted to riparian. This alternative would provide an overall benefit to foraging habitat for the Swainson's hawk.

Combined Alternative 6

Combined Alternative 6 would have similar effects as Combined Alternative 1. Foraging habitat for Swainson's hawk in the project area would be increased by implementation of Combined Alternative 6. New foraging habitat would be created through restoration of a total of 70 acres of grasslands and 150 acres of savannah that may be utilized for foraging by the Swainson's hawk. These 220 acres would more than offset the loss of foraging habitat on approximately 90 acres of grain crops that would be converted to riparian. This alternative would provide an overall benefit to foraging habitat for the Swainson's hawk.

Mitigation Measures

Measures to avoid or minimize the construction effects to Swainson's hawk include; avoiding nesting periods of the species if present within the project area (March 1 - September 15), performing a field survey (if applicable) prior to construction, and avoiding disturbing nests during construction. Also, every effort shall be made to avoid removal of riparian vegetation and heritage oaks. Vegetation (e.g., trees and shrubs) could be fenced and flagged for avoidance. Direct destruction of the nest, or disturbance to nesting pairs of Swainson's hawk by noise or dust disturbance, would be considered a potentially adverse effect. Due to the institution of mitigation measures, however, the species survival and recovery would not be adversely affected.

Since the long-term effects to the Swainson's hawk would be beneficial, no mitigation would be required.

Western Yellow-billed Cuckoo

Effects

No-Action Alternative

Habitat for western yellow-billed cuckoo in the project area is expected to remain similar to existing conditions under the future without-project conditions scenario. Future urban development effects on special-status species could be reduced by compliance with requirements in the Federal and State Endangered Species Act and local ordinances designed to conserve special status species.

Combined Alternative 1

Equipment operation during construction could disturb the western yellow-billed cuckoo, through noise, vibration, and airborne dust, and the duration of such disturbance could be substantial. If such disturbance occurs during the nesting season, mortality could occur if the adults leave the nest for prolonged periods of time. Effects to riparian vegetation on the existing levee would be avoided by leaving appropriate sections of the levee in place.

With the setback levee and the restoration effort proposed, new areas of riparian (860 acres), oak savannah (140 acres), scrub (225 acres), and native grassland (62 acres) habitat would be created. With the creation of the riparian restoration areas, there would be an overall beneficial effect on the western yellow-billed cuckoo.

Combined Alternative 5

Combined Alternative 5 would have similar effects as Combined Alternative 1, and new areas of riparian (1064 acres), oak savannah (150 acres), scrub (290 acres), and native grassland (80 acres) habitat would be created. With the creation of the riparian restoration areas, there would be an overall beneficial effect on the western yellow-billed cuckoo.

Combined Alternative 6

Combined Alternative 6 would have similar effects as Combined Alternative 1. New areas of riparian (1,000 acres), oak savannah (150 acres), scrub (261 acres), and native grassland (70 acres) habitat would be created. With the creation of the riparian restoration areas, there would be an overall beneficial effect on the western yellow-billed cuckoo.

Mitigation Measures

Short-term effects to the yellow-billed cuckoo can be avoided or minimized by implementing the following measures: avoid nesting periods of the species if present within the project area, perform a field survey (if applicable) prior to construction, and avoid disturbing nests during construction. Also, the removal of riparian vegetation will be avoided. Riparian vegetation (e.g., trees and shrubs) will be fenced and flagged for avoidance. Effects to riparian vegetation on the existing levee will be avoided by leaving appropriate sections of the levee in place. With these measures in place, short-term effects will be reduced to less than significant.

Since short-term effects can be avoided and the long-term effects to the western yellow-billed cuckoo would be beneficial, no additional mitigation would be required.

5.3.9 Socioeconomic Conditions

Basis of Significance. For NEPA purposes, an alternative would be considered to have a significant effect on socioeconomic resources if it would result in population changes, residential relocations, business losses, job losses, changes in public services, and/or losses of local tax revenue that are incompatible with local agency goals or projections. Socioeconomic effects are not treated as potentially significant effects under CEQA (CEQA Guidelines Section 15131 (a)).

Effects

No-Action Alternative

Under the no-action alternative, it is expected Glenn County would continue to pursue a pro-economic growth policy to enhance the socioeconomic conditions of the county.

Combined Alternative 1

Implementation of Combined Alternative 1 would result in a variety of economic gains and losses for the local region. Economic losses to the region result from the loss of agricultural jobs. The economic gains to the region result from the reduction of economic losses due to flooding, increased opportunity for growth within the Hamilton City community, and an increase in jobs associated with construction, ecosystem management, and increased recreation opportunities.

The loss of 1,300 acres of agricultural land would result in economic losses to the region due to the loss of agricultural jobs. TNC funded a study of the Socioeconomic Assessment of Proposed Habitat Restoration within the Riparian Corridor of the Sacramento River Conservation Area. This analysis determined that as a result of converting 2,696 acres from agriculture to restoration, approximately 66 jobs would be lost (see Table 5-7).

TABLE 5-7: GLENN COUNTY DIRECT AND INDIRECT/INDUCED JOBS¹

	Acres Restored	Direct Job Losses²	Indirect Job Losses³	Total Job Losses
Total	2,696	30	36	66
Per Acre		0.0111	0.0134	

Source: Draft Socioeconomic Assessment of Proposed Habitat Restoration Within the Riparian Corridor of the Sacramento River Conservation Area, Nature Conservancy, September 2002. Table 6-13.

² Jobs directly involved with agricultural production (for example, farm workers)

³ Jobs indirectly involved with agricultural production (for example, those who provide equipment)

Application of this percentage ratio to Combined Alternative 1 indicates a potential job loss of approximately 31 jobs (see Table 5-8). In Glenn County, there are approximately

11,851 jobs in the agricultural industry. A loss of 31 jobs would represent a 0.3 percent loss (U.S. Department of Commerce 2002).

TABLE 5-8: HAMILTON CITY RESTORATION AGRICULTURE JOB LOSSES

Acres Restored	Direct Job Losses	Indirect Job Losses	Total Job Losses	County Employment	Loss as Percent of Total Employment
1,000	11	13	24	11,851	0.21 percent
1,300	14	17	31	11,851	0.27 percent
1,500	17	20	37	11,851	0.31 percent
1,600	18	21	39	11,851	0.33 percent

The loss of agricultural jobs must be considered in context with economic gains that would result from implementation of this alternative. The jobs potentially lost by the project would be compensated for, in part, by the short-term creation of jobs in the construction sector of the local economy. This would be a short-term benefit during construction of the project. Long-term ecosystem management and recreation related jobs would also be generated by the project and would also compensate, in part, for the loss of agricultural jobs.

Additionally, implementation of the proposed project would enhance existing levels of flood protection along the river and in particular, the surrounding urban area. Studies on the effects of natural disasters on local economics indicate that flooding has the potential to create significant short-term economic effects on communities resulting from the disruption of business and governmental activities, destruction of capital equipment and public infrastructure, and temporary dislocation of various portions of the local workforce. Improvement of flood control would provide additional protection to the community and their local economy against the significant short-term effects of flooding. In addition to decreased negative effects of flooding on local economies, increased flood protection may encourage industries to locate in the area producing a net beneficial effect on the local economy. However, this alternative would not provide a 100-year level of protection under FEMA standards, and therefore would not alter the regulation of land use in the floodplain pursuant to the National Flood Insurance Program. The constraint on development due to flooding would not be eliminated. While it is conceivable that the project would have a positive effect upon property values within the community, the magnitude of such an effect, if it exists, would be very speculative, but possible.

The project would somewhat enhance community cohesion by reducing damages from flooding and contributing to a greater sense of well being. The community cohesion that resulted from the shared vision of improved flood protection and the shared experience of working together to find a solution would be further reinforced by the sense of accomplishment resulting from a successful project. The community has repeatedly provided strong overall support for the project based on participation at public meetings and community statements of support. Given the strong local support for reducing flood damages, the net socioeconomic effect to the local community, including Hamilton City and Glenn County, would likely be compatible with local goals. Thus, any socioeconomic effect would not be significant.

Combined Alternative 5

Combined Alternative 5 would have similar effects as Combined Alternative 1 with agricultural land converted, 1,600 acres, resulting in a potential job loss of approximately 39 jobs (or 0.3 percent of the total agricultural jobs in the county). Similar economic gains would also result from this alternative.

Given the strong local support for reducing flood damages, the net socioeconomic effect to the local community, including Hamilton City and Glenn County, would likely be compatible with local goals. Thus, any socioeconomic effect would not be significant.

Combined Alternative 6

Combined Alternative 6 would have similar effects as Combined Alternative 1 with agricultural land converted, 1,500 acres, resulting in a potential job loss of approximately 37 jobs (or 0.3 percent of the total agricultural jobs in the county). Similar economic gains would also result from this alternative.

Support for this alternative from the local community, including Hamilton City and Glenn County, is indicative that the net socioeconomic effects of the project are compatible with local goals. Thus, any socioeconomic effects are not significant.

Mitigation Measures

Since the effects to socioeconomic conditions would be less than significant, no mitigation would be required.

5.3.10 Agricultural /Prime and Unique Farmlands

Basis of Significance. An alternative would be considered to have a significant effect if it would result in an irretrievable conversion of a substantial acreage of farmland. An irretrievable conversion is considered to be one that involves the conversion to land uses that would cause serious degradation of the quality of the physical environment and/or result in expenditures of substantial development costs that would likely preclude future conversion back to agriculture.

NEPA focuses on agriculture as a land use with associated socioeconomic effects while CEQA considers only the effects on the physical conditions of the land including, but not limited to, air and water quality, flora, fauna, soils and ambient noise. Taking commercial agriculture out of production is not per se considered a significant effect to the physical environment under CEQA. The subsequent reuse of the land must be considered to determine whether there is an effect on the physical environment. The socioeconomic effects associated with the loss of commercial agriculture are not treated as significant effects under CEQA (CEQA Guidelines Section 15131(a)).

Effects

No-Action Alternative

Agriculture is the major industry in the study area, particularly orchards that are considered a long-term investment. Historically, orchards have been planted and grown in the surrounding area, and current land use is expected to continue. Land under Williamson

Act or Farmland Security Zone Act contracts would remain in agriculture for the remainder of the contract, usually a 10-year or 20-year commitment, respectively.

Glenn County maintains a policy that allows for the conversion of agriculture to other uses to provide for the necessary diversity and growth required in the local economy. Lands within the urban limit lines are to be converted prior to lands outside of the urban limit lines. In addition, agricultural lands may decline in the future due to seepage, erosion, flooding, and scouring associated with the lands along the Sacramento River. Due to these factors, potential investments to keep such lands productive may diminish.

Combined Alternative 1

Combined Alternative 1 would affect the agricultural land in the study area. Land currently in grain and orchards would become part of the floodplain between the river and the new setback levee. This alternative includes an area of 1,468 acres and would convert 1,288 acres (rounded to 1,300 in the rest of the document) from agriculture to native habitat. The new setback levee would provide improved flood protection for farmlands on the landside of the new levee.

The conversion of agricultural lands to habitat would occur on lands that lie on the waterside of the proposed setback levee. These lands are currently vulnerable to flooding and erosion, which adversely affects the viability of agriculture on these lands by increasing management costs and the risk of crop failure. The new setback levee would provide improved flood protection for farmlands on the landside of the new levee. This would improve economic conditions for growers that are farming these lands. In addition, conversion of agricultural lands for ecosystem restoration would be considered beneficial to the physical environment, including soils, due to reintroduction of natural organisms to the soil, deposition of sediment, decreased tillage, and reduction of exposure to chemicals used in agricultural production.

National Resource Conservation Service Rating. The NRCS conducted an analysis and provided the Corps with a Farmland Conversion Impact Rating letter for the alternative (see Appendix B). The NRCS determined that the relative value of farmland to be converted was rated at 75 out of a possible 100, based on an evaluation using the Storie Index. The Corps completed the site assessment portion of the rating, with a rating of 95 out of 160 points. Thus, the combined score was 170 out of 260 points. According to the Farmland Protection Policy Act, farmland receiving a rating less than 160 need not be given further consideration for protection, and alternative actions do not need to be considered. The U.S. Department of Agriculture recommends that sites receiving scores totaling 160 or more be given increasingly higher levels of consideration for protection. The other alternatives were reconsidered, but did still not meet study objectives or had similar ratings as Combined Alternative 1.

State Department of Conservation LESA Model. In an effort to assess the effect of the conversion of farmland to other uses, the California Department of Conservation recommended that the California Agricultural Land Evaluation and Site Assessment (LESA) model be used for this study. The LESA model is an optional method that can be used in a CEQA assessment to ensure that significant environmental effects of agricultural land conversions are quantitatively and consistently considered in the environmental review process (Public Resource Code, Section 21095).

The LESA model was used for this study, but found to be inappropriate for assessing the potential effects of conversion of farmland to ecosystem restoration projects for several reasons. First, the model does not analyze whether or not there would be significant effects on the physical environment. Rather, the model assumes that there would be significant adverse effects. The model quantifies the degree of the effect based on limited parameters such as quality and location of soils. There are many important factors that the model does not take into consideration. These include the following: restoration projects actually provide a benefit to the physical environment, including soils; conversion of agricultural lands for restoration can be reversed much more easily than conversion to urban use; and agricultural lands would benefit from increased flood protection.

The Reclamation Board has agreed that based on the limitations of the LESA model, requirements of CEQA, and with input from other State agencies, that the LESA model was not appropriate to assess the potential effects from the conversion of agricultural land for ecosystem restoration projects.

Williamson Act and Farmland Security Zone Act Contracts. Combined Alternative 1 would affect two parcels under a Williamson Act contract. One parcel, which covers 143.5 acres north of Highway 32 in Zone G, is owned by TNC. The other parcel covers 139.5 acres south of Road 23 in Zone B2 and is privately owned. The combined acreage is 283 acres. Two other parcels in the study area under a Williamson Act contract are on USFWS property and are not included as part of the proposed restoration. The alternative would also affect a 100.7-acre parcel protected by a Farmland Security Zone Act contract in Zone B2, south of Road 23.

Summary. The conversion of prime and unique farmlands for ecosystem restoration would not result in an irretrievable adverse environmental effect on these farmlands and thus would not be considered a significant effect. The conversion of these lands to native habitat would not degrade soils, but would instead improve the soils due to reintroduction of natural organisms to the soil, deposition of sediment, decreased tillage, and reduction of exposure to chemicals used in agricultural production. The conversion of these farmlands for ecosystem restoration would also not require huge expenditures as would be required for conversion to urban development. Therefore, if public priorities and policies change in the future, these lands could be converted back to agriculture without major socioeconomic effects. However, any future conversion of areas restored with native vegetation to commercial agricultural production would likely be considered to be a significant adverse effect under CEQA.

Combined Alternative 5

Combined Alternative 5 would have similar effects on agricultural land as Combined Alternative 1. Land currently in grain and orchards would become part of the floodplain between the river and the new setback levee. This alternative includes an area of 1,812 acres and would convert 1,600 acres from agriculture to native habitat. The new setback levee would provide improved flood protection for farmlands on the landside of the new levee.

The conversion of prime and unique farmlands for ecosystem restoration associated with Combined Alternative 5 would not result in an irretrievable effect on these farmlands and thus would not be considered a significant effect. The conversion of agricultural lands to native habitat would have a significant beneficial effect on the physical environment.

Combined Alternative 5 includes the proposed restoration of three parcels under a Williamson Act contract. Two of these properties are owned by TNC and are located north of Highway 32 in Zone G (144 acres) and Zone H (189 acres). The third parcel, located south of Road 23 in Zone B2, covers 139.5 acres and is privately owned. The total acreage in Williamson Act contracts is 472 acres. Two other parcels in the study area under a Williamson Act contract are on USFWS property and are not included as part of the proposed restoration. The alternative would also affect a 100.7-acre parcel protected by a Farmland Security Zone Act contract in Zone B2, south of Road 23.

Combined Alternative 6

Combined Alternative 6 would have similar effects on agricultural land as Combined Alternative 1. Land currently in grain and orchards would become part of the floodplain between the river and the new setback levee. This alternative includes an area of 1,658 acres and would convert 1,500 acres from agriculture to native habitat. The new setback levee would provide improved flood protection for farmlands on the landside of the new levee.

The conversion of prime and unique farmlands for ecosystem restoration associated with combined Alternative 6 would not result in an irretrievable effect on these farmlands and thus would not be considered a significant effect. The conversion of agricultural lands to native habitat would have a significant beneficial effect on the physical environment.

Combined Alternative 6 includes the proposed restoration of three parcels currently under a Williamson Act contract. Two of these properties are owned by TNC and are located north of Highway 32 in Zone G (144 acres) and Zone H (189 acres). The third parcel, located south of Road 23 in Zone B2, covers 139.5 acres and is privately owned. The total acreage under Williamson Act contracts for Combined Alternative 6 is 472 acres. Two other parcels in the study area under a Williamson Act contract are on USFWS property and are not included as part of the proposed restoration. Combined Alternative 6 would also affect a 100.7-acre parcel protected by a Farmland Security Zone Act contract in Zone B2 south of Road 23.

Mitigation Measures

Although the NCRS rating exceeded 160, no mitigation is required since other alternatives were reconsidered, but either did not meet study objectives or had similar ratings. Since the conversion of farmland to habitat under this project is not considered to have a significant adverse effect on the physical environment under CEQA, no mitigation is required under CEQA.

Glenn County has indicated that due to strong local and agency support for this project, it is in the best public interest to release these lands from Williamson Act and Farmland Security Zone Act contracts, convert these agricultural lands to native habitat, and construct a setback levee to increase flood protection to Hamilton City and surrounding agricultural lands behind the new setback levee.

The alternatives would be consistent with the CALFED ROD requirements for conversion of agricultural lands to restoration. All alternatives are considered to have less-than-significant effects on agriculture and Prime and Unique Farmlands. The numerous requirements regarding agriculture and Prime and Unique Farmland in the CALFED ROD are

being met by the project. A list of the requirements, as well as a detailed description of how this project meets each of these requirements, is included in Chapter 9 and Appendix B-7.

5.3.11 Urban Land Use

Basis of Significance. Adverse effects on urban land use were considered significant if implementation of an alternative would conflict with any applicable land use plan or regulation of an agency with jurisdiction over the project (including, but not limited to the general plan or zoning ordinance), or if the alternative were to divide an established community.

Effects

No-Action Alternative

Urban development trends in California would continue, as population levels are projected to increase. Acres would continue to move from other categories to the urban land use category. Projects primarily would be implemented on agricultural lands, natural habitat, or land use categories other than urban.

Under the no-action alternative, the TNC lands would continue to be farmed at least in the short-term. However, the TNC lands are under threat of flooding and erosion from the Sacramento River under the no-action alternative and the long-term productivity of these lands is doubtful. These lands are currently outside the urban limit lines for Hamilton City.

Combined Alternative 1

The realigned levee would limit the eastward urban growth potential of Hamilton City; however, the levee alignment is outside of the urban growth limit for Hamilton City and would therefore not have significant negative effects on urban land use. This combined alternative would not provide a 100-year level of protection under FEMA standards, and therefore would not alter the regulation of land use in the floodplain pursuant to the National Flood Insurance Program. The constraint on development due to flooding would not be eliminated in the eastern portion of Hamilton City, which is within the FEMA regulatory floodplain.

Combined Alternative 5

The realigned levee would limit the eastward urban growth potential of Hamilton City; however, the levee alignment is outside of the urban growth limit for Hamilton City and would therefore not have significant negative effects on urban land use. This combined alternative would not provide a 100-year level of protection under FEMA standards, and therefore would not alter the regulation of land use in the floodplain pursuant to the National Flood Insurance Program. The constraint on development due to flooding would not be eliminated in the eastern portion of Hamilton City, which is within the FEMA regulatory floodplain.

Combined Alternative 6

The realigned levee would limit the growth potential of Hamilton City; however, the levee alignment is outside of established growth limits and would therefore not have significant adverse effects on urban land use. This combined alternative would not provide a

100-year level of protection under FEMA standards, and therefore would not alter the regulation of land use in the floodplain pursuant to the National Flood Insurance Program. The constraint on development due to flooding would not be eliminated in the eastern portion of Hamilton City, which is within the FEMA regulatory floodplain.

Mitigation Measures

Since the combined alternatives would not alter the constraint on development due to flooding in the eastern portion of Hamilton City, there would be no significant effects requiring mitigation.

5.3.12 Transportation

Basis of Significance. An alternative would be considered to have a significant effect on transportation if it would cause an increase in traffic that is substantial in relation to the existing load and capacity of a roadway, an increase in safety hazards on area roadways, or cause substantial deterioration of the physical condition of area roadways.

Effects

No-Action Alternative

As population increases and Hamilton City expands, traffic and safety hazards on area roadways are likely to increase. However, the area will continue to be essentially a rural community. As the area grows, more roads and other transportation infrastructure can be expected.

Combined Alternative 1

Temporary effects may occur to local roads during construction due to the hauling of materials used for levee construction. Some of the materials would come from the existing levee, which would not cause any effects to transportation resources. However, approximately one-half of the materials required for construction would be obtained from the GCID dredged spoil pile, which lies between the Glenn-Colusa Canal and County Road 203/Highway 45, from the fish screen south along the canal. Implementation of the alternative would increase traffic and vibration levels along the project access routes from this borrow source to the project area. Although the construction area is some distance from town, residential and commercial land uses in the vicinity of the construction sites would experience increased traffic and vibration levels from both haul trucks and onsite construction equipment. Construction activities would generate additional traffic to the site resulting from mobilization activities; commuting of construction workers; hauling of workers, equipment, and materials; and supervision and inspection activities. This alternative would result in temporary effects to County Roads 203 and 23 as construction would be required on these roads to ramp them over the new levee. Transportation disruptions would occur as a result of construction-related detours and temporary levee access, staging and construction activities. Increased truck traffic on area roadways may also pose an increased safety hazard and may adversely impact the condition of area roadways. These effects would be potentially significant effects.

There would be no long-term adverse effects on the area roadways. The Highway 32 approach to Gianella Bridge would be reinforced with rock to avoid an increased risk of

erosion at the bridge due to removal of the existing levee. The new levee alignment would not change flooding effects to County Road 23.

The reduced likelihood of flooding would increase transportation capabilities, particularly for Highway 32, within the protected area behind the new levee by increasing levels of protection to transportation-related infrastructure during high-river flows.

Combined Alternative 5

This alternative has similar effects to Combined Alternative 1, with the exception that the levee alignment for this alternative ties into Road 203 approximately 1,600 feet south of the existing "J" Levee. Road 203 would be reinforced at this intersection. This alignment also differs in that it crosses Highway 32 well to the west of the existing levee. Highway 32 between the new alignment and the river would be raised to ensure no increase in flooding due to the setback alignment. The raising of Highway 32 would have substantial effects to transportation due to the detour and delay in traffic resulting from construction.

Combined Alternative 6

Temporary construction effects to transportation would be similar to those discussed under Combined Alternative 1. The benefits to transportation from increasing levels of protection to transportation-related infrastructure would also be similar to those discussed under Combined Alternative 1.

Mitigation Measures

To promote efficient, safe access to construction staging areas, an Access Management Plan would be prepared and implemented prior to the initiation of construction activities. The following would be considered in this plan:

- The ability of proposed access routes to accommodate high levels of construction vehicle and truck traffic. Factors would include road width, surface conditions, and vertical clearance.
- Securing necessary easements for roads and staging areas, including consideration of improvement and maintenance costs, construction traffic signs, restoration activities, and damage provisions.

Affected people would be informed about the expected changes in traffic levels, and reasonable accommodations to help ensure safety (e.g., temporary fencing and slower construction speed limits) would be considered. Mitigation with best management practices would result in less than significant effects.

5.3.13 Recreation

Basis of Significance. An alternative would be considered to have a significant effect on recreation if the project increases use of existing recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated, if it would result in the loss of recreational facilities, or if it would cause a substantial disruption in a recreational activity or opportunity.

Effects

No-Action Alternative

The no-action alternative would not have adverse impacts to current recreation facilities or recreational activities. The demand for recreation in the study area (camping, fishing, etc.) is expected to increase consistent with the population growth rate.

As a result, the no-action alternative could result in increased use of current facilities, which could degrade the facilities more quickly or have a negative impact on the user's experience due to overcrowding. Additionally, no improvement to public river access and recreational facilities may increase the possibility of trespassing onto public and private property, which could increase environmental damage.

Combined Alternative 1

No long-term adverse impacts to recreation are anticipated with implementation of the proposed project. Existing facilities would not be lost or experience any increased use. This alternative would be compatible with planned recreation facilities within the study area. Creating a setback levee would have temporary effects to the boat launching facility at Irvine Finch, requiring the implementation of mitigation measures. This temporary effect would not occur during the prime fishing season (fall and winter) but would occur when fishing is at its lowest (spring and summer). However, the boat launching facility is used heavily during the late spring and summer and these users would be redirected to neighboring river access sites.

Combined Alternative 5

Combined Alternative 5 would have similar impacts as Combined Alternative 1. This alternative would not result in any significant effects to recreation.

Combined Alternative 6

Combined Alternative 6 would have similar impacts as Combined Alternative 1. This alternative would not result in any significant effects to recreation only temporary effects to the Irvine Finch boat launching facility.

Mitigation Measures

Mitigation would only be required for short-term construction impacts to recreation resulting from temporary closure of designated recreation facilities (e.g., parking areas, boat ramps, restrooms, picnic facilities, walkways, etc.). These effects shall be minimized through advance communication. Prior to completion of final plans and specifications, the Department of Parks and Recreation (DPR) shall review the plans and specifications to ensure that they contain language requiring that signs be posted at every parking facility that is temporarily unavailable at least one month in advance of construction; the signs must indicate the proposed construction schedule and alternative parking facilities that can be used during the construction period. This measure would be monitored and enforced by the DPR. This measure would likely be necessary near the Irvine Finch River Access during project construction. Any facilities damaged or destroyed during construction would be repaired or replaced.

5.3.14 Aesthetics

Basis of Significance. An alternative would be considered to have a significant effect on aesthetics if changes in landform, vegetation, or structural features create substantially increased levels of visual contrast as compared to surrounding conditions.

Effects

No-Action Alternative

Without the project, aesthetic conditions would likely remain the same as they are now.

Combined Alternative 1

Restoration of 1,300 acres of riparian, scrub, savannah, and grassland habitats would improve the visual resources along the river. Aesthetics may be temporarily affected during construction phases because of the presence of construction and earth-moving equipment. Temporary effects to aesthetics during construction would not be considered significant. The restoration of riparian, scrub, savannah, and grassland habitats would improve visual resources along the river. This would be a beneficial effect.

Combined Alternative 5

Restoration of 1,600 acres of riparian, scrub, savannah, and grassland habitats would improve the visual resources along the river. Aesthetics may be temporarily affected during construction phases because of the presence of construction and earth-moving equipment. Temporary effects to aesthetics during construction would not be considered significant. The restoration of riparian, scrub, savannah, and grassland habitats would improve visual resources along the river. This would be a beneficial effect.

Combined Alternative 6

Combined Alternative 6 would have similar effects as Combined Alternative 1 with the same number of acres proposed for restoration at 1,500. Temporary effects to aesthetics during construction would not be considered significant. The restoration of riparian, scrub, savannah, and grassland habitats would improve visual resources along the river. This would be a beneficial effect.

Mitigation Measures

Since the long-term effects of Aesthetics would be beneficial, no mitigation would be required.

5.3.15 Noise

Basis of Significance. An alternative would be considered to have a significant effect on noise if it would substantially increase the ambient noise levels for adjoining areas. The significance of temporary noise effects is evaluated with reference to existing noise levels, the duration of the noise, and the number of sensitive receptors affected.

Effects

No-Action Alternative

Noise levels are expected to increase with increasing population, traffic, and urban development in the Hamilton City area.

Combined Alternative 1

Noise levels would increase temporarily from the operation of equipment during construction. Conversion of agricultural land, approximately 1,300 acres, to restoration would decrease long-term noise effects from the decrease in use of farming equipment. This alternative would have an overall beneficial effect on noise.

Combined Alternative 5

Noise levels would increase temporarily from the operation of equipment during construction. Conversion of agricultural land, approximately 1,600 acres, to restoration would decrease long-term noise effects from the decrease in use of farming equipment. This alternative would have an overall beneficial effect on noise.

Combined Alternative 6

Combined Alternative 6 would have similar effects as Combined Alternative 1, however with an increase in the construction period due to the longer levee length from 5.5 miles to 6.8 miles. A larger area would be restored in Combined Alternative 6 and more agricultural land would be converted, approximately 1,500 acres, therefore a greater long-term decrease in noise from farming equipment would result. This alternative would have an overall beneficial effect on noise.

Mitigation Measures

Best management practices would be used to lessen the short-term effects of construction noise.

5.3.16 Hazardous, Toxic, and Radiological Waste

Basis of Significance. An alternative would be considered to have a significant effect if it would involve substances identified as potentially hazardous (for example, by the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA); and/or 40 CFR Parts 260 through 270); and (1) expose workers to hazardous substances in excess of Federal Occupational, Safety, and Health Administration standards, or (2) contaminate the physical environment, thereby posing a hazard to people, animals, or plant populations by exceeding Federal exposure, threshold, or cleanup limits.

Effects

No-Action Alternative

Without the project, any existing but previously unidentified Hazardous, Toxic, and Radioactive Waste (HTRW) would remain on site. Existing conditions may continue or the situation may become worse if contaminated soil or ground water migrates through resource areas with high concentrations of petroleum, hydrocarbons, or agricultural chemicals.

Contamination of ground water and soils could result from the flooding of agricultural land where continued farming practices such as irrigation and chemical application of pesticides occurs.

Combined Alternative 1

Since the only identified HTRW sites are outside of the project area, Combined Alternative 1 would not affect any known HTRW sites. Conversion of 1,300 acres of agricultural land would decrease dispersal of pesticides due to flooding of agricultural areas. This is expected to have an overall beneficial effect.

Combined Alternative 5

Since the only identified HTRW sites are outside of the project area, Combined Alternative 5 would not affect any known HTRW sites. Conversion of 1,600 acres of agricultural land would decrease dispersal of pesticides due to flooding of agricultural areas. This is expected to have an overall beneficial effect. Irvine Finch River Access near the Sacramento River and the State Highway 32 may flood, but effects to the environment would be minimal based on the site inspections conducted on July 12, 2001, and March 28, 2003.

Combined Alternative 6

Since the only identified HTRW sites are outside of the project area, Combined Alternative 6 would not affect any known HTRW sites. Combined Alternative 6 would have similar effects as Combined Alternative 1 with 1,500 acres converted from agriculture. This is expected to have an overall beneficial effect. There would be no significant negative impact on the Hamilton City community and the surrounding farmlands.

Mitigation Measures

Since the effects of Hazardous, Toxic, and Radiological Waste would be beneficial, no mitigation would be required.

5.3.17 Cultural Resources

Basis of Significance. An alternative would be considered to have a significant adverse effect on cultural resources if it would diminish the integrity of the resource's location, design, setting, materials, workmanship, feeling, or association. Types of effects include physical destruction, damage, or alteration; isolation or alteration of the character of the setting; introduction of elements that are out of character with the property; neglect; and transfer, lease, or sale of the property.

Effects

No-Action Alternative

Conditions of cultural resources sites within the proposed project area would remain the same. Levee failure and resultant flooding could damage archeological sites in the project area.

Combined Alternative 1

The alternative could have an effect on an historic Indian mound site, however; this site has been in agriculture for a number of years and it is likely that no effect would result. Any effects to the St. John site, Indian Dance house, Swift's Point, and Shotover Inn, identified historic properties, would be avoided as these sites are located outside of the project area. In addition, Combined Alternative 1 could require alterations to the Gianelli Bridge which is listed as a historic property; however, the entire bridge has been modernized and replaced and is no longer considered historic. There should be no effects to cultural resources.

Combined Alternative 5

Combined Alternative 5 would have similar impacts as Combined Alternative 1. There should be no effects to cultural resources.

Combined Alternative 6

Combined Alternative 6 would have similar effects as Combined Alternative 1. Combined Alternative 6 is not likely to have significant effects to cultural resources.

Mitigation Measures

Since there is not likely to be an effect to Cultural Resources, no mitigation would be required.

5.4 GROWTH-INDUCING EFFECTS

The growth-inducing section of the Feasibility Report/EIR/EIS is required by CEQA. According to CEQA Guidelines, a growth-inducing effect is one that could foster economic or population growth, directly or indirectly bringing about construction of additional housing in the surrounding environment (Section 15126[g]). This section addresses existing population growth and densities in and near the study area and examines existing and with project growth-inducing conditions.

Effects

No-Action

The study area is not currently subject to rezoning and remains mostly in agricultural land. Since the no-action alternative would not increase levels of flood protection, it is not expected that this alternative would induce additional growth or development within the study area. Areas subject to 100 year flooding are currently considered a constraint to development in the Glenn County General Plan and the urban growth boundary for Hamilton City is delineated as such. The no-action alternative would not change the current growth boundaries.

Combined Alternative 1

Combined Alternative 1 is outside the urban growth boundary for Hamilton City. Growth in Hamilton City is expected to continue as overflow from the city of Chico spreads to the Hamilton City area. Development would not occur in the restoration area, approximately 1,300 acres. The alternative would increase the level of flood protection to 90 percent

confidence of passing the 75-year flood event (not FEMA-level certification). This combined alternative would not provide a 100-year level of protection under FEMA standards, and therefore would not alter the regulation of land use in the floodplain pursuant to the National Flood Insurance Program.

Hamilton City currently has a well-defined growth boundary, as defined in the Glenn County General Plan. Much of the undeveloped area within the urban growth limits of Hamilton City is outside of the limits of the FEMA 100-year floodplain (Figure 4-4). Thus, the City has adequate room for growth regardless of whether any additional flood protection is provided. One of the most recent developments within Hamilton City occurred in an area near the eastern boundary of the City, within the 100-year floodplain, but included the requirement to place structures on pads that raised the structures out of the floodplain. This kind of development is indicative that the growth of the City is not seriously constrained by the limits of the 100-year floodplain. Since areas within the FEMA 100-year floodplain can be developed under existing conditions, and since most of the undeveloped areas are currently outside of this floodplain, it is reasonable to conclude that the increased level of flood protection provided by this alternative would have little to no effect on growth.

Combined Alternative 5

Combined Alternative 5 is outside the urban growth boundary for Hamilton City. Growth in Hamilton City is expected to continue as overflow from the city of Chico spreads to the Hamilton City area. Development would not occur in the restoration area, approximately 1,600 acres. The Alternative would increase the level of flood protection 90 percent confidence of passing the 75-year flood event (not FEMA-level certification). This combined alternative would not provide a 100-year level of protection under FEMA standards, and therefore would not alter the regulation of land use in the floodplain pursuant to the National Flood Insurance Program.

For the reasons described under Combined Alternative 1, it is reasonable to conclude that the increased level of flood protection provided by this alternative would have little to no effect on growth.

Combined Alternative 6

Combined Alternative 6 would have similar effects as Combined Alternative 5; however, the levee alignment just east of Hamilton City is further to the east than the levee for Combined Alternative 5. Development would not occur in the restoration area, approximately 1,500 acres. The Alternative would increase the level of flood protection 90 percent confidence of passing the 75-year flood event (not FEMA-level certification). This combined alternative would not provide a 100-year level of protection under FEMA standards, and therefore would not alter the regulation of land use in the floodplain pursuant to the National Flood Insurance Program. Combined Alternative 6 would have a negligible effect on long-term regional growth.

For the reasons described under Combined Alternative 1, it is reasonable to conclude that the increased level of flood protection provided by this alternative would have little to no effect on growth.

Mitigation Measures

There are no mitigation measures proposed for growth-inducing impacts because, the combined alternatives would not provide a 100-year level of protection under FEMA standards, and therefore would not alter the regulation of land use in the floodplain pursuant to the National Flood Insurance Program. The constraint on development due to flooding would not be eliminated in the eastern part of Hamilton City.

5.5 CUMULATIVE EFFECTS

NEPA regulations and CEQA Guidelines require that an EIR/EIS discuss project effects that, when combined with the effects of other projects, result in significant cumulative effects. The purpose of this analysis is to identify cumulative adverse effects. The NEPA regulations define cumulative effect as:

"The effect on the environment which results from the incremental effect of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative effects can result from individually minor or collectively significant actions taken over a period of time" (40 CFR 1508.7).

The CEQA Guidelines require that an EIR discuss cumulative effects "when they are significant" (Section 15130). The CEQA Guidelines define cumulative effects as "two or more individual effects which, when considered together, compound or increase other environmental effects" (Section 15355). Additionally, the CEQA Guidelines state: "The cumulative effect from several projects is the change in the environment which results from the incremental effect of the project when added to the other closely related past, present, and foreseeable probable future projects" (Section 15355).

Cumulative effects are evaluated by identifying other projects that, in addition to the alternatives, could have significant effects in the study area. The existing restoration projects in the study area include: Pine Creek, RX Ranch, and Bidwell Park. There is also an overall restoration effort within the Sacramento River conservation area being coordinated under the Sacramento River Conservation Area Forum (SRCAF), which includes both riparian restoration and the restoration of the meander zone for the Sacramento River (see Figure S-4).

Although urbanization is not a particular problem in the project area, it has been identified as a significant cause of the loss of agricultural lands in the Central Valley. Urbanization is occurring in mostly small, but sometimes large increments throughout the Central Valley. Between 1998 and 2000, 137 acres of prime farmlands and 223 acres of other important farmland were converted to urban uses in Glenn County. Figure 4-4 shows the existing urban limit line for Hamilton City. Prime farmland currently occurs within this boundary. How much of this prime farmland will be converted for urban use in the future and when it would be converted will depend upon many factors. However, it is reasonable to assume that much of it will be converted at some point in time. If land currently zoned for urban development is to be converted to urban uses, those projects would need to comply with environmental laws to evaluate potential effects. The proposed project would not affect growth trends within the existing urban limits.

The existing flood protection efforts in the study area are the Sacramento River, Chico Landing to Red Bluff project, emergency bank protection under PL84-99, and placement of rubble by private parties for bank protection. In addition, the Sacramento River Flood

Control Project, Glenn-Colusa Irrigation District Fish Screen Improvement Project was recently completed just upstream of the project area.

The project effects caused by the current project that could contribute to potentially significant cumulative effects are the effects to prime and unique farmlands and the effects caused by the placement of rock revetment along the riverbank. For other resources, effects are not adverse, only beneficial, or only short-term and do not contribute to any known cumulative effects. The proposed project would contribute to the collective beneficial effects of other restoration projects in the vicinity of the project. This collective beneficial effect would include the synergistic effect among restoration activities associated with increased connectivity, increased diversity of habitat, and the increased size of the overall restoration effort.

The alternatives considered in this EIS/EIR would contribute to the cumulative effects of the conversion of prime and unique farmland in the vicinity of the project area and throughout the valley due to other restoration efforts and to urbanization. As discussed under agricultural impacts these alternatives would not have a significant effect on prime and unique farmlands but would contribute between 1,300 and 1,600 acres to the overall conversion of agricultural land in the region. This amounts to between 0.29 percent and 0.35 percent of the total farmland in Glenn County. The conversion of agricultural lands attributed to the project is primarily occurring on lands with diminishing long-term productivity because of their current vulnerability to flooding and erosion. The improved flood protection provided by this project would contribute to higher long-term productivity on agricultural lands on the landside of the new levee. Nevertheless, the project would contribute to the loss of prime and unique farmland in the area. A total of 1,032 acres of important farmland was converted to urban or to other non-agricultural land uses in Glenn County between 1998 and 2000. This projected cumulative loss of agricultural lands may be significant.

This project has been developed to be consistent with the CALFED Programmatic Record of Decision (ROD) (August 2000). The CALFED ROD determined that the collective effect of CALFED associated activities on conversion of farmlands was a significant effect. The Corps and The Reclamation Board considered the strategies described in the ROD, Attachment A, in developing the project. In addition, the agencies considered the programmatic commitments related to implementation of CALFED actions to ensure this project would be consistent with the ROD. A more detailed discussion of how the project is consistent with these strategies and commitments is included in Section 9.1.4.

The Chico Landing to Red Bluff project provides for bank protection totaling sixteen miles at 29 sites. A total of 6,800 feet of rock was placed within the project area as part of this project. No bank protection has been placed under this authority since 1985. Another 450 feet of rock was placed in the project area under PL84-99 for emergency bank protection. Finally, private efforts to increase bank stability have resulted in the placement of 6,300 feet of rubble along the bank. Under the current project, up to 100 feet of rock and/or grouted rock and/or a concrete lining would be placed under the Gianella Bridge at Highway 32 abutment specifically to protect it from exposure to higher velocities resulting from passing higher flows. Although the current project is responsible for only 100 feet of rock placement along the existing bank, the rock is being placed to protect an existing structure, and the overall project would have long-term beneficial effects on biological resources and

water quality, there is a significant adverse cumulative effect associated with the placement of rock revetment.

5.6 UNAVOIDABLE ADVERSE EFFECTS

The CEQA Guidelines state that any significant environmental effects, which cannot be avoided if the project is implemented, must be described. This description extends to those significant adverse effects that can be mitigated, but not reduced to a level of insignificance.

5.6.1 No-Action

Under the No-Action Alternative, no unavoidable adverse effects would occur.

5.6.2 Combined Alternative 1

Under Combined Alternative 1, no significant unavoidable adverse effects would occur.

5.6.3 Combined Alternative 5

Under Combined Alternative 5, no significant unavoidable adverse effects would occur.

5.6.4 Combined Alternative 6

Under Combined Alternative 6, no significant unavoidable adverse effects would occur.

5.7 RELATIONSHIP OF SHORT-TERM USES AND LONG-TERM PRODUCTIVITY

Although changes to CEQA have eliminated the need for the EIR to address the relationship between local short-term uses of the human environment and maintenance of long-term productivity, the requirement still exists in NEPA.

5.7.1 No-Action

The study area is not currently subject to rezoning and remains mostly in agriculture. Since the no-action alternative would not increase levels of flood protection, it is not expected that this alternative would induce additional growth or development within the study area.

5.7.2 Combined Alternative 1

Combined Alternative 1 includes short-term uses of the environment that would result from restoration of the floodplain. Adverse effects could result from construction-related activities such as reduced air quality and increased noise and traffic. These short-term uses would occur only during the construction phase of the project and would not adversely affect the long-term productivity of the environment. In the long-term, planting to restore habitat would enhance the long-term productivity of the Sacramento River watershed. The long-term productivity of the restoration area would provide an overall beneficial effect from Combined Alternative 1.

5.7.3 Combined Alternative 5

Combined Alternative 5 would have similar effects as Combined Alternative 1. The long-term productivity of the restoration area would provide an overall beneficial effect from Combined Alternative 5.

5.7.4 Combined Alternative 6

Combined Alternative 6 would have similar effects as Combined Alternative 1. The long-term productivity of the restoration area would provide an overall beneficial effect from Combined Alternative 6.

5.8 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

In accordance with the CEQA Guidelines (Sections 21083 and 21087), this Feasibility Report/EIR/EIS discusses any irreversible and irretrievable commitment of resources that would be involved in the Alternatives. Significant irreversible environmental changes are defined as uses of nonrenewable resources during the initial and continued phases of the alternatives that may be irreversible since a large commitment of these resources makes future removal or nonuse unlikely.

No-Action

The no-action alternative would not have any effect on irreversible and irretrievable commitments of resources.

Combined Alternative 1

Combined Alternative 1 would include construction activities that would include the consumption of fossil fuels and other energy resources needed to remove levees and construct a new setback levee. This work would permanently affect approximately 5.5 miles where the new levee would be constructed.

Combined Alternative 5

Combined Alternative 5 would include construction activities that would include the consumption of fossil fuels and other energy resources needed to remove levees and construct a new setback levee. This work would permanently affect approximately 5.3 miles where the new levee would be constructed.

Combined Alternative 6

Combined Alternative 6 would have similar effects as Combined Alternative 1 with an increase in the levee length to 6.8 miles. The area where the levee would be built would have a permanent change in land use.

5.9 IDENTIFICATION OF ENVIRONMENTAL PREFERENCES FOR ALTERNATIVES

5.9.1 Least Environmentally Damaging Practicable Alternative

The Congress of the United States enacted the Clean Water Act (CWA) to “restore and maintain the chemical, physical, and biological integrity of the Nation’s waters.” Section 404 of the CWA regulates the discharge of dredge and fill materials into waters of the United

States, and establishes a permit program to ensure that such discharges comply with environmental requirements. The Corps and the U.S. Environmental Protection Agency (EPA) administer the Section 404 program. The Section 404(b)(1) Guidelines contain the substantive environmental criteria used in evaluating all Section 404 permit applications. While the Corps does not formally permit actions by its own agency, Corps is required to follow the intent of the Section 404 (b)(1) permit requirements and as such, may only propose discharges of dredged or fill material into waters of the United States that represent the **least environmentally damaging practicable alternative (LEDPA)**, so long as the alternative does not have other significant adverse environmental consequences. Generally, this is the practicable alternative that either avoids waters of the United States or impacts the smallest areas of waters, but exceptions can occur as a result of the alternative analysis process.

The tentatively selected plan (TSP) is the LEDPA for the Hamilton City Flood Damage Reduction and Ecosystem Restoration Feasibility Study. The TSP has been shown to be the most effective and efficient method of achieving the identified planning objectives consistent with plans and guidance (P&G) and other guidance. The TSP is complete, has net positive effects on environmental resources including wetland and aquatic resources and needs no other features or actions to achieve the intended objectives. Accordingly, this alternative is the LEDPA for this study. It has the least adverse impact on the aquatic ecosystem; does not cause or contribute to violations of any applicable State water quality standards, 40 CFR Section 230.10 (b) (1); complies with the Endangered Species Act (ESA) and does not jeopardize the continued existence of species listed as endangered or threatened under the 1973 ESA, 40 CFR 230.10(b)(3); does not cause or contribute to significant degradation of waters of the United States; and includes mitigation to assure that any remaining impacts are addressed. (40 CFR Section 230.10 (d)).

5.9.2 Environmentally Preferred Alternative

CEQ regulations implementing the National Environmental Policy Act require the identification of an environmentally preferred alternative in the Record of Decision for an EIS. After weighing the ecosystem restoration benefits against the environmental consequences of each alternative, Combined Alternative 5 was selected as the environmentally preferred alternative. It produces the greatest ecosystem restoration benefits.

5.9.3 USFWS Preferred Alternative

Combined Alternative 5 was identified by the USFWS in their Draft Fish and Wildlife Coordination Act Report (Appendix B) as their preferred alternative. They cite the facts that this alternative has the highest outputs of ecosystem restoration benefits and restores the largest acreage as the reasons for their selection. They also indicated that any of the proposed alternatives would be acceptable to them.