



CALFED
BAY-DELTA
PROGRAM

Affected Environment and Environmental Impacts

Cultural Resources

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**CALFED Bay-Delta Program
Environmental Impacts/Consequences
Cultural Resources Technical Report**

1.0 INTRODUCTION

The intent of the CALFED Bay-Delta Program (Program) is to develop long-term solutions to problems affecting the San Francisco Bay/Sacramento-San Joaquin Delta estuary in Northern California. Overall, the effect of the Program is expected to be beneficial. However, specific Program components may have potentially adverse impacts.

The purpose of this technical report is to document, in a programmatic manner, the potential impacts of the Program on cultural resources. The objective is to describe and analyze effects on cultural resources that could result from the no action alternative or implementing any of the three Program alternatives. This report discusses potential impacts that may occur in the five regions within the study area including the Delta Region, Bay Region, Sacramento River Region, San Joaquin River Region, and the SWP and CVP Service Areas. This report also contains a brief description of mitigation strategies designed to reduce Program impacts to a less significant level. The executive summary contained in this technical report in conjunction with other information, data, and modeling developed during prefeasibility will be used to prepare the environmental impacts section of the Programmatic EIR/EIS.

Cultural resources is a broad term that includes prehistoric sites, historic sites, and traditional cultural properties. Within the broad range of cultural resources, historic properties those cultural resources that have recognized significance. Historic Properties are defined as any prehistoric or historic district, site building, structure, or object, included on, or eligible for inclusion on, the National Register of Historic Places.

2.0 Executive Summary

Cultural resources include prehistoric sites, historic sites, and traditional cultural properties. Historic Properties, significant cultural resources, are defined as any prehistoric or historic district, site building, structure, or object, included on, or eligible for inclusion on, the National Register of Historic Places (NRHP).

The presence of cultural resources is largely determined by environmental factors and by contemporary development. Prehistoric and historic sites, for example, are often concentrated along waterways. Prehistoric sites in the Delta Region are found near sea level. Areas likely to contain archeological and historical sites coincide with some proposed projects. But, many cultural resources have been damaged or destroyed from intensive agricultural and urban growth, although sites may still be discovered in areas of intense development.

Cultural resources will be affected by Bay-Delta activities. Construction projects can affect cultural resources through grading, excavation, or dredging. Barrow pits, spoil dumps, equipment staging areas, and road construction are also activities that can potentially affect

cultural resources. Construction impacts include the developmental footprint for new facilities, dams, or control structures. Finally, inundation affects cultural resources through erosional, chemical, and biological means.

Three levels of impact are considered. Minor, moderate and high impacts are subjectively assigned to projects based upon the amount of potential surface disturbance and the integrity of the land form. Gravel replacement projects for habitat enhancement and revegetation are examples of minor impacts. Set back levees are rated as a moderate impact. Flooding parcels for habitat improvement or water storage can represent a high impact. Modifying existing irrigation facilities and the relocation of structures may affect properties. Finally, indirect impacts related to recreation also can affect cultural resources.

The criteria for determining the significance of cultural resources varies between state and Federal governments. At the Federal level the National Register of Historic Places has been established by statute to list historic properties deemed to have historical significance (36 CFR 60). The four criteria for eligibility and other issues associated with significance are discussed in the Bay-Delta Cultural Resource Technical Appendix.

The California Register of Historic Resources (CRHR) provides a parallel state process for identifying and evaluating cultural resources. Also currently in effect at the state level are the CEQA Statutes and Guidelines, Appendix K, Section III, which define an "important" archeological resource. Other state programs that are in place to recognize important historic sites include California Historic Landmarks and California Points of Historical Interest.

Federal regulations (36 CFR 800.5) outline the process for assessing effects to historic properties as the result of a Federal undertaking. Three options exist for a determination of effect: No Effect, No Adverse Effect, and Adverse Effect. In brief, an undertaking will have an effect upon historic properties when the action alters the characteristics of the historic property that make it eligible for inclusion in the NRHP.

Delta Region

Cultural resources in the Delta Region will experience minor to moderate impacts from ecosystem restoration projects and from levee stabilization and set back efforts. The other two prongs of the common programs, water quality and water use efficiency, will not affect cultural resources.

Conveyance actions proposed for the Delta Region under Alternative 1 involve minor modifications of existing facilities or only short connectors. Disturbance is expected to be limited and impacts are rated as minor. Conveyance under Alternative 2 increases the proposed actions and impacts. Levee setbacks are viewed as a potential moderate impact because of extensive earth movement and the sensitivity associated with water. Clifton Court Forebay is the end point of three potential intake projects and each is rated as a potential moderate impact. Finally, other impacts to cultural resources include flooding of certain tracts, the acquisition of land along the Mokelumne River and the relocation of certain facilities.

Options found under Alternative 3 repeat some of the same projects identified in Alternatives 1 and 2. A variety of additional projects are also included in the nine sub-alternatives for this alternative with minor impacts to cultural resources. Intakes, pumping plants, new gates, and new bridges are examples. Moderate impacts are expected for the open channel from Brentwood to Clifton Court Forebay, storage of water on several islands and the set back levees along Old River. In the case of the open channel, there are one archeological and three historical sites recorded in the general area. Inventories for this area, however, have not been completed.

Alternative 3 contains projects that carry the potential for high impacts to cultural resources because of the action's magnitude and the area's archeological sensitivity. Various conveyance alternatives exist to transport water from Hood to the Clifton Court Forebay. The alignment is potentially sensitive since it partly falls outside peat soils and numerous waterways are crossed. Six previously recorded prehistoric sites and one historic site are found along the route. The route has not been inventoried and unrecorded sites are undoubtedly present. Finding buried archeological sites during construction also is possible.

Bay Region

Cultural resources of the Bay Region will experience no impacts from the alternatives.

Sacramento River Region

The Sacramento River Region is slated for a variety of projects under the Ecosystem Restoration Program. Habitat improvement, fish facilities, the relocation of water facilities and the upgrade of structures are types of projects that would have a minor and possibly moderate impact to cultural resources.

The Sacramento River Region will experience impacts from Alternative 1 as a result of surface storage of up to 3.0 MA and ground water storage of up to 500 TA. New reservoirs represent significant surface disturbance with high construction and flooding impacts. Ground water storage offers some of the same impacts since percolating basins are needed, but the overall scope of such projects is often less than a new or enlarged reservoir. Nearly 30 reservoirs are being examined for possible construction or enlargement under alternatives for the Sacramento River Region. Cultural resources will be affected because of the extent of surface disturbance.

The Dutch Gulch Reservoir is an example of a on-stream reservoir. Most of the proposed reservoir has been inventoried. Results include 117 prehistoric sites and 160 historic sites. Preliminary evaluations for inclusion in the NRHP indicate that 17 prehistoric and 160 historic sites are not eligible. The remaining sites are largely combined into three prehistoric and one historic district.

San Joaquin River Region

Projects associated with the Ecosystem Restoration Program in the San Joaquin River Region may affect cultural resources. The program calls for a variety of habitat restoration actions as well as modification of existing fish screens and weirs to better protect fish species. The potential impacts to cultural resources from these actions include primarily minor and possibly moderate construction activity.

Options under Alternative 1 call for surface storage of up to 1.0 MA and ground water storage of up to 500 TA. This alternative has 10 possible reservoir sites. The Montgomery Reservoir is a small facility that may become a portion of this alternative. No cultural resource information has been collected for this project, but a site density model (West, Welch, Hansen 1995) predicts that 24 sites will be found in the project area. Historic mining activity took place in the area, but specific historic sites are unknown.

Alternative 2 calls for smaller surface storage behind new or enlarged reservoirs in the San Joaquin River Region compared to Alternative 1. One major difference between these two alternatives is the proposed use of off-aqueduct storage. Eleven South-of-Delta aqueduct storage projects are possible with a maximum pool of 2.0 MA. One such reservoir area has been inventoried with the discovery of 35 prehistoric and 6 historic sites.

Impacts for Alternative 3 in the San Joaquin River Region are similar to Alternative 2.

Implementing one of the alternatives will not result in any direct impacts to the SWP and CVP Service Area. No structures, conveyance facilities, storage projects or habitat improvements are planned. There will be slight differences in the flows of water in some streams, but these changes will not affect cultural resources.

3.0 Assessment Methods

Several factors affect the impact that CALFED Bay-Delta projects will have upon cultural resources. Prehistoric and historic sites are not distributed uniformly across the landscape and environmental factors are important in determining where sites are found. Prehistoric and historic sites (> A.D. 1850), for example, tend to be found along waterways. Work done elsewhere in the Central Valley also demonstrates that late prehistoric sites are more likely to be found in certain soil-land forms (West, Welch, and Hansen 1995).

Elevation also is an important factor in predicting the presence of prehistoric sites within the Suisun-Delta area. Elevations in the area range from -18 feet below sea level to 200 above sea level. The majority of prehistoric sites in the Suisun-Delta area are found within ± 5 feet of mean sea level. This elevation approximates the 1850 tidal line as defined by Atwater (1982). Many of the areas likely to contain archeological and historical sites are located in the same areas as Program activities in the Delta Region.

The overwhelming agricultural development within the Delta, Sacramento River, and San Joaquin River Regions as well as the massive industrial and residential development associated

with the Bay Region have severely altered the archeological and historical record. Many sites have been destroyed and obliterated. Sites in urban areas have been capped by asphalt or concrete. Prehistoric mounds have been leveled for agricultural fields. Artifacts have been broken and their context compromised or destroyed by repeated plowing. Any trace of a site may be difficult to see in agricultural fields and, today sites that were recorded at the turn-of-the-century, can no longer be found. Program activities involving agricultural fields will not have the same potential impact as projects proposed for undeveloped areas. Nonetheless, prehistoric sites may still be discovered in areas of intense agricultural development (Peak and Associates 1997). Levees have reportedly covered prehistoric sites and sites may also be disturbed by channel modifications and levee setbacks. Determining the level of cultural resource inventory for future projects in the study area requires evaluating these factors and consulting with the State Historic Preservation Office (SHPO).

Projects requiring construction can affect cultural resources in a variety of ways (Table 1). Construction may include grading, excavation, or dredging with heavy equipment. Such activity would take place at the site for a new reservoir or during levee setback. Sites may be disturbed or destroyed from being scraped away, leveled, or buried under fill. Ancillary barrow pits, spoil dumps, equipment staging areas, and road construction are activities that also must be considered. Finally, construction also includes the actual footprint from the construction of new facilities, dams, or control structures.

Minor construction is defined as activities with little surface disturbance. Specific impacts to cultural resources includes actions with limited use of heavy equipment. Some of the gravel replacement projects for habitat enhancement are an example. Minor construction projects may involve hand work such as revegetation where access is provided by truck.

The flooding of parcels for habitat improvement or flooding as the result of water storage is a programmatic impact. Specific impacts to cultural resources by inundation are well documented (Lenihan et. al 1981). Historic and prehistoric sites are subject to erosion from

Impact Type	Specific Impacts	Example
Construction	<ul style="list-style-type: none"> ○ Grading/excavation ○ Fill/bury/cover ○ Barrow pits/spoil removal ○ Equipment staging ○ Build structures/facilities ○ Dredging 	<ul style="list-style-type: none"> ○ Levee setback ○ Levee setback ○ Levee ○ Levee, restoration ○ New structures ○ Open water areas
Minor Construction	<ul style="list-style-type: none"> ○ Limited heavy equipment ○ Truck access, hand work ○ Revegetation ○ gravel replacement 	<ul style="list-style-type: none"> ○ Spread gravel ○ Fence Building ○ Stream Side Planting ○ Habitat Improvement

Flooding	<ul style="list-style-type: none"> ○ Inundation/sedimentation ○ Erosion/wave action ○ Wet/dry cycling ○ Bioturbation 	<ul style="list-style-type: none"> ○ Seasonal Wetlands ○ Shallow Flooding ○ Off-Stream Storage ○ Reservoirs
Modification	<ul style="list-style-type: none"> ○ Reconfigure structures ○ Replace structures ○ Relocate facilities/houses 	<ul style="list-style-type: none"> ○ Relocate Diversion ○ Improve Fish Screens ○ Flood Homes
Miscellaneous	<ul style="list-style-type: none"> ○ Recreation ○ OHV activity 	<ul style="list-style-type: none"> ○ Improved Fishing ○ Exposed Reservoirs
Acquisition	<ul style="list-style-type: none"> ○ Property under Federal law 	<ul style="list-style-type: none"> ○ Protect Habitat

Table 1. Potential impacts to cultural resources. Generalized impact and the associated specific impacts from project implementation.

fluctuating water levels. Artifacts can be consolidated or dispersed as intervening sediments are washed away. Artifacts themselves may be physically or chemically altered by being inundated. Prehistoric midden deposits are adversely affected by cycles of wetting and drying. Finally, clams, such as *Corbicula*, or other aquatic taxa may disturb sites by borrowing.

Modification of existing irrigation facilities may affect properties or facilities that are eligible for inclusion on the NRHP. Agricultural development in the Central Valley began in the 1840s. Modifying gate structures or irrigation facilities, for example, may damage historically significant properties. Razing buildings or relocating houses requires assessment to ensure that historic values are not destroyed without consideration.

Miscellaneous indirect impacts related to recreation also can affect cultural resources. Off road vehicular activity in reservoir draw down zones, for example, can disturb sites. Increased recreational activity as a result of improved opportunities could lead to increased amounts of unwitting vandalism or purposeful artifact theft.

The acquisition of property may lead to a positive impact for cultural resources. Once a property is placed under Federal control, it then comes under the jurisdiction of Federal law and consideration of historic properties is required.

Identifying potential impacts from implementation of Program alternatives involves blending the level of impacts of a particular activity with the integrity of the land. A construction activity may have a substantial surface disturbing component, but if the integrity of the land is low than the environmental impact will be less than if the action were conducted on undeveloped property. The affects of a project range from low for minor actions to high for major projects. The integrity of a landscape also ranges from low for heavily disturbed areas such as agricultural lands to high for those areas that are uncultivated and undeveloped. Putting these together in a matrix gives a better definition of actual potential impacts. Table 2 depicts the range of impacts

and integrity to generate three levels of "weighted" impacts, low (1), moderate (2), and high (3). These numbers, also appear in Table 3, portray the range of potential surface disturbance impacts factoring in the potential for finding intact cultural resources. These numbers do not take into consideration variation in landform or other environmental factors for finding archeological sites.

I M P A C T S	HIGH	2	3	3
	MODERATE	1	2	3
	LOW	1	1	2
		LOW	MODERATE	HIGH
		INTEGRITY		

Table 2. Matrix of impacts and landscape integrity showing the weighted potential impact to cultural resources for an action. 1: low potential impacts, 2: moderate potential impacts, 3: high potential impacts.

4.0 SIGNIFICANCE CRITERIA

The criteria for determining significance varies between state and Federal governments. At the Federal level the National Register of Historic Places (NRHP) has been established by statute to list historic properties deemed to have historical significance (36 CFR 60). For a property to be eligible for listing in the NRHP or to be listed in the NRHP, it must meet one of the criteria and retain integrity. The four criteria for eligibility and other issues associated with significance are discussed in the Bay-Delta Cultural Resource Technical Appendix. National Historic Landmark status is afforded to those properties with national significance. The program is administered by the National Park Service.

The California Register of Historic Resources (CRHR) provides a parallel state process for identifying and evaluating cultural resources. The register represents a comprehensive listing of California's historical resources. The CRHR places a greater emphasis on local values in assessing significance. The CRHR significance criteria is mirrored after the federal NRHP. Also currently in effect at the state level are the CEQA Statutes and Guidelines, Appendix K, Section III, which define an "important" archeological resource. Other state programs that are in place to recognize important historic sites include California Historic Landmarks and California Points of Historical Interest.

Conveyance: Delta Region			Storage: Range of Options		
ALT	Actions	Impacts ¹	Surface\Impacts	GroundH2O\Impacts	Region
All	Common Programs: Ecosystem Restoration Restore Habitat (Multiple Actions)	a. Con\1,2 b. Flo; Acq	----	None	Delta
All	Restore Habitat; Protect Vernal Pools	a. Con\1 b. Acq	----	None	Bay
All	Restore habitat; Fish Screens/Passages; Relocate Diversions; Facilities Upgrade	a. Con\1,2 b. Mod	----	None	Sacramento
All	Restore Habitat; Fish Screens/Weir	a. Con\1,2 b. Mod	----	None	San Joaquin
All	Common Programs: Levee System Integrity Rehabilitate; Set Back; Shallow Flooding	a. Con\1,2 b. Flo	----	None	Delta
1A	None	None	None	None	None
1B	a. Barrier @ Old River b. Flow & stage control: Middle/Old R., Grant Line c. New fish screens: Skinner and Tracy d. Intertie: Tracy & Clifton Court	a. Con\1 b. Con\1 c. Mod d. Con\1	None	None	None
1C	a. New Clifton Court intake b. Channel enlargement c. See 1Ba and 1Bb	a. Mod b. Con\1 c. See above	a. 3.0 MAF ² : Con\3, Flo b. 1.0 MAF: Con\3, Flo	a. 500 TAF: Con\2? b. 500 TAF: Con\2?	a. Sacramento a. San Joaquin
2A	a. Hood: Gated intake, fish screen, bypass b. Hood: Open channel, setback levee, relocate c. Hood: Breach McCormack Williamson d. 600 ft. corridor @ Mokelumne River e. Set back levees; remove levees, relocate f. 1Ca, 1Cb, 1Ba-1Bd	a. Con\1 b. Con\2 c. Flo d. Acq e. Con\2 f. See above	None	None	None
2B	Same as 2A	Same as 2A	Same as 2E	Same as 2E	Same as 2E

ALT	Conveyance: Delta Region		Storage: Range of Options		
	Actions	Impacts ¹	Surface\Impacts	GroundH2O\Impacts	Region
2C	a. Intake @ Holland Tract b. Set back levee c. Convey: Old River to Clifton d. Convey: in-Delta storage on Holland Tract e. Relocation f. Intake: SJo River @ Roberts Island g. Convey to Clifton h. 2Cf-2Ch, 1Ca, 1Bc, 1Bd	a. Con\1 b. Con\2 c. Con\2 d. Con\2 e. Rel f. Con\1 g. Con\2 h. See above	a. 50-100 TAF @ Holland Tract: Con\2	a. None	a. Delta
2D	a. 2Aa-2Ac, 2Ce b. Set back levee: New Hope, Terminous, Staten Is. c. Remove levees: S.F. Mokelumne, Bouldin Island d. Set back levees: Old River e. 1Ca, 1Ba, 1Bc, 1Bd	a. See above b. Con\2 c. Con\2 d. Con\2 e. See above	a. 2.0 MAF off-aqueduct: Con\2	a. None	a. San Joaquin
2E	a. Set back levee: Georgiana Slough b. Inflatable rubber dam c. Channel section control in Georgiana Slough d. Breach Tyler Island levee e. Rip rap interior levees f. 2Ac, 2Db, 2Dc, 2De, 1Ba, 1Bc, 1Bd	a. Con\2 b. Unknown c. Con\1? d. Con\1 e. Con\1 f. See above	a. 3.0 MAF: Con\3 b. 500 TAF: Con\2 c. 2.0 MAF: Con\3 (off-aqueduct)	a. 500 TAF: Con\2 b. 500 TAF: Con\2	a. Sacramento b. San Joaquin c. San Joaquin? (South of Delta)
3A	a. 2Ad, 2Ae, 1Ca, 1Cb, 1Bb-1Bd, 2Ce b. Screened intake & pumping plant @ Hood c. 2000 ft. alignment: Hood to Clifton d. 5000 cfs channel: Hood to Clifton	a. See above b. Con\1 c. Con\1? d. Con\3	None	None	None
3B	Same as 3A; spur links w/ Bay and E. Delta	Above, Con?	Same as 2E, + 200 TAF	Same as 2E	See 2E, Delta
3C	a. 2Aa, 2Ce b. 45 mi. 18' dia pipe to Clifton c. Spur conveyance to Bay Area and east Delta	a. See above b. Con\3 c. Con\2	None	None	None
3D	Same as 3C	Same as 3C	Same as 3B	Same as 3B	Same as 3B
3E	a. 2Ad, 2Ae, 1Ca, 1Ba, 1Bc, 1Bd, 2Aa, 3Ac, 2Ce b. 15,000 cfs channel: Hood to Clifton	a. See above b. Con\3	Same as 3B	Same as 3B	Same as 3B

ALT	Conveyance: Delta Region		Storage: Range of Options		
	Actions	Impacts ¹	Surface\Impacts	GroundH2O\Impacts	Region
3F	a. Enlarged Delta Cross Channel; fish screen; pump b. New gates & supplemental intake + channel c. Distributed pump stations w/ cylinder screens d. Storage: Tyler, Bouldin, Venice, Mandeville, ... e. New bridges; bridges: Victoria & Bouldin f. Low lift pump stations; seepage intercept wells g. 2Ee, 2Ad, 2Ae, 1Ba, 1Bc, 1Bd	a. Con\1 b. Con\1 c. Con\1 d. Con\2 e. Con\1 f. Con\1 g. See above	Same as 2E	Same as 2E	Same as 2E
3G	a. 2Ad, 2Ae, 2Ce, 1Ca, 1Cb, 1Ba-1Bd b. New screened intake: Deep Water Ship Channel c. Ship Channel Closure and Pumps d. Unscreened pump @ mi. 18.7; Siphon: Cache Slough e. Pipeline to Sac River; siphon under Sac/SJo Riv f. Open channel from Brentwood to Clifton	a. See above b. Con\1 c. Con\2 d. Con\2 e. Con\2 f. Con\2	Same as 3B	Same as 3B	Same as 3B
3H	a. 2Ea-2Ee, 2Ac, 2Db, 2Dc, 1Ca, 1Ba, 1Bc, 1Bd b. 2Aa, 3Ac, 3Ad, 2Ce c. Set back levees @ Old River: 3000 ft. channel	a. See above b. See above c. Con\2	Same as 2E	Same as 2E	Same as 2E
3I	a. 2Ca-2Cg, 2Aa, 1Ca, 1Bc, 1Bd, b. Siphons: under stream crossings; SJo River	a. See above b. Con\2	a. Same as 2E b. 50-100 TAF @ Holland	a. Same as 2E	a. Same as 2E b. Delta

Table 3. Impacts to cultural resources from conveyance and storage projects. Notes: (1) Con\1\2\3 refer to construction impacts: \1 is minor, \2 is moderate, and \3 is major. Other codes: Flo: Flooding impacts, Acq: Acquisition impacts, Mod: Modification impacts; Rel: Relocation impacts (see text for details). (2) MAF: Million acre-feet, TAF: Thousand acre-feet. Other abbreviations: Clifton: Clifton Court Forebay, Tracy: Tracy Pumping Plant, SJo: San Joaquin.

Compliance with Section 106

Section 106 of the National Historic Preservation Act requires a consultation process between the Federal agency, SHPO and the Advisory Council on Historic Preservation (ACHP) to ensure that potentially significant historic resources have been adequately considered in the planning process. Federal funding for a project triggers requirements of Section 106 even if a state agency is implementing the action. If a historic property is determined to be legally important under Federal statute, and if the property is adversely affected, then a mitigation plan must be prepared in consultation with the SHPO and ACHP. If an archeological or historical site is deemed not legally important, both the resource and the effect on it should be noted but need not be considered further in the process. In the Bay-Delta Program, where both CEQA and NRHP evaluation criteria apply, Federal standards prevail. Historic properties assessed as NRHP-eligible are also considered significant and procedures for managing these properties under 36 CFR 800 satisfy the CEQA Statutes and EIR Guidelines as well.

Federal regulations (36 CFR 800.5) outline the process for assessing effects to historic properties as the result of a Federal undertaking. Three options exist for a determination of effect: No Effect, No Adverse Effect, and Adverse Effect. In brief, an undertaking will have an effect upon historic properties when the action alters the characteristics of the historic property that make it eligible for inclusion in the NRHP.

5.0 ENVIRONMENTAL IMPACTS

5.1 Impact Analysis

5.1.1 Description of No-Action Resource Conditions

5.1.1.1 Delta Region

The vast majority of the Delta Region has been placed under intensive agricultural development for many decades. The use of levees has increased the acreage under cultivation. It is highly likely that many of the nearly 100 recorded archeological sites within the legal Delta have been substantially disturbed if not completely destroyed as the result of repeated farming, tilling, and discing. As described in the Assessment Methods, the integrity of sites within this region is low.

5.1.1.2 Bay Region

The level of impacts associated with the Bay Region is also high. Industrial developments lie along the fringe of the Bay-Land interface. Numerous developments have altered the shoreline and few undisturbed areas remain. Shipping and warehouse facilities help make the Bay an important commercial center. Impacts to any cultural resources is nearly total, although some prehistoric sites can still be found. Residential areas cover much of the surrounding

hills, swales, and ridges overlooking the Bay Region. Such intense development has covered or destroyed many archeological sites. The region's importance in the history of California has left a number of historic resources. Recent development has also taken a toll on the region's historic legacy.

5.1.1.3 Sacramento River Region

The level of impacts experienced by the Sacramento River Region is varied. The agricultural lands of the valley floor have substantially altered the native landscape. Many, if not most of the archeological sites in the agricultural lands have been compromised. The level of impacts to these lands is high. Foothill areas above the vast agricultural development of the Central Valley contain many relatively intact archeological sites. Prime areas for settlement along streams and drainages were often targets of early gold mining efforts. Overall the integrity of this region ranges from poor to moderate. Some of the facilities associated with agricultural development are of historic value.

5.1.1.4 San Joaquin River Region

This region is similar to the Sacramento River Region.

5.1.1.5 SWP and CVP Service Area

The service areas are characterized by intense agricultural development and sporadic urban settings. Archeological sites are more likely to be found in those areas that have not been completely developed. Historic properties occur in undeveloped areas, but they also are found associated with older agricultural areas and in urban locations.

5.1.2 Description of Alternative Resource Conditions

5.1.2.1 Delta Region

Table 3 summarizes Program activities and associated impacts. The table is divided into three parts. The first part deals exclusively with the Common Programs. Actions are identified, impacts are generically described as Con\1 (minor construction), Con\2 (moderate construction), Flooding, Acquisition, or Modification, and the first part also identifies actions proposed for each region. The section on Assessment Methods and Table 2 describe these impacts. The Common Programs are proposed for each alternative.

The final two parts of Table 3 list each permutation of the three alternatives. Actions are divided into conveyance alternatives for the Delta Region or the storage options for each of the regions. Anticipated impacts from each action are identified per methods described above.

5.1.2.1.1 Common Programs

Table 3 presents a comprehensive summary of generalized actions and impacts associated with two of the four common programs and each alternative and their respective variations. Cultural resources will be potentially affected by ecosystem restoration projects and by levee stabilization and set back efforts. Possible impacts to cultural resources include a variety of construction actions, flooding, and acquisition of property. The other two programs dealing with water quality and water use efficiency will not affect cultural resources. Impacts in the Delta Region are rated as either as a Con\1 (minor construction) or Con\2 (moderate construction).

A multitude of minor construction projects will take place. As an example, revegetation projects, improved fish passages, undesirable plant species eradication, and establishing shallow water habitat could have a relatively minor impact to archeological and historic sites. Conversely, gravel replacement, new flood ways, and levee setbacks may constitute a moderate impact to cultural resources because of the proximity these activities have to water ways, areas of potentially greater archeological and historic sensitivity.

5.1.2.1.2 Alternative 1

Conveyance actions proposed for the Delta Region under Alternative 1 are presented in Table 3. Impacts associated with the variations of this alternative are minor construction and the modification of existing structures. The construction, for example, of a barrier at Old River under Alternative 1B represents a probable minor impact (Con\1). The disturbance is expected to be limited. The new Clifton Court intake proposed under Alternative 1C is an example of an impact that represents modification of an existing facility. No cultural resources have been recorded in the vicinity of Clifton Court, although formal inventories will be needed prior to project implementation. There are no storage components in the Delta Region for Alternative 1.

5.1.2.1.3 Alternative 2

Alternative 2 repeats proposals identified in Alternative 1 and increases the range of proposed actions and impacts (Table 3). A series of facilities upgrades or installations are proposed. The intakes proposed for Hood and Holland Tract, for example, constitute minor impacts (Con\1). Several of the subalternatives call for setback levees along various islands, sloughs and rivers. Levee setbacks are viewed as a potential moderate impacts (Con\2) due to the extensive earth movement required combined with the sensitivity associated with the proximity of water sources. In the Delta Region prehistoric and historic sites are often clustered along water courses. As an example, levee setbacks along the North Fork of the Mokelumne River may affect six recorded prehistoric sites and two historic sites. The actual number of sites affected by this levee project, however, is contingent upon future inventories.

The flooding of several tracts is an option under this alternative. Breaching the levees at Bouldin Island, Brack Tract and the Canal Ranch Tract to create aquatic and wetlands habitat is projected as a moderate impact despite the

fact that only one prehistoric site has been recorded in the area. Construction and flooding along potentially archeologically sensitive water ways dictate moderate level of impacts.

Several conveyance projects are called for under the options of Alternative 2 (Table 3). Clifton Court Forebay is the end point of three potential Intake projects. One project, involving a 15,000 cfs conveyance from Roberts Island, is an example of a potential moderate impact (Mod\2). This project involves extensive construction and earth movement, but the bulk of this effort takes place in areas of as much as 10 feet of peat deposits (California Department of Water Resources 1993). These areas hold a low potential for encountering archeological sites. The Roberts Island conveyance parallels Whiskey and Trapper Slough as well as Victoria Canal, man-made conveyances. There are no archeological or historical sites recorded along the route.

Additional impacts associated with options under Alternative 2 involve flooding of certain tracts, the acquisition of land along the Mokelumne River and the relocation of certain facilities.

5.1.2.1.4 Alternative 3

The array of options found under Alternative 3 repeats some of the same projects identified in Alternatives 1 and 2 (Table 3). A variety of additional projects are included in the 9 sub-alternatives for this alternative. The project options include a wide range of activities that represent a minor impact to cultural resources (Con\1). Intakes, pumping plants, new gates, and new bridges are examples.

Moderate impacts (Mod\2) are expected for other projects. The open channel from Brentwood to Clifton Court Forebay, storage of water on several islands and the set back levees along Old River are examples of projects of moderate impacts. In the case of the open channel, there is one archeological and three historical sites recorded in the area. Some inventory for this area have been completed, but the final route has not been fully examined.

Alternative 3 also contains possible projects that are considered to carry the potential for high impacts (Con\3) to cultural resources. Various conveyance alternatives exist to transport water from Hood to the Clifton Court Forebay. The alignment, the same for each alternative, is potentially sensitive since it falls outside peat soils and numerous waterways are crossed. The archeological records revealed that there are approximately six prehistoric and one historic sites in the vicinity of the route. Impacts are considered high due to the sheer magnitude of the project, the presence of potentially sensitive archeological areas, and the amount of disturbance such an undertaking would entail. The route has not been inventoried and unrecorded sites are undoubtedly present. Encountering buried archeological sites during excavations is also a distinct possibility.

5.1.2.2 Bay Region

None of the alternatives involve construction activities that would affect cultural resources in the Bay Region.

5.1.2.3 Sacramento River Region

5.1.2.3.1 Common Programs

A variety of projects are proposed under Ecosystem Restoration for the Sacramento River Region. These projects call for habitat improvement, fish facilities, the relocation of water facilities and upgrade of structures. The potential impacts to cultural resources from these actions include primarily minor and possibly moderate construction activity (Con\1,2). Site specific inventories and evaluations are needed to fully evaluate impacts from activities of the ecosystem restoration program.

5.1.2.3.2 Alternative 1

The Sacramento River Region will experience impacts from Alternative 1. Options under this alternative call for surface storage of up to 3.0 MAF and ground water storage of up to 500 TAF (Table 3). New reservoirs represent significant surface disturbance with high construction impacts (Con\3) and impacts associated with flooding. Ground water storage offers some of the same impacts since percolating basins are needed, but the overall scope of such projects is less than a new or enlarged reservoir.

The Cottonwood Creek Reservoir Complex is an example of a project that includes high construction impacts to cultural resources. The complex consists of the Dutch Gulch and Tehama Reservoirs. The cultural resources inventoried from Dutch Gulch include 117 prehistoric and 166 historic sites. These properties were evaluated for their inclusion in the NRHP and 17 prehistoric and 124 historic sites were determined to be ineligible. The remaining properties were considered eligible and were subdivided into three prehistoric districts, one historic district, seven individual prehistoric sites and two individual historic sites (Johnson and Theodoratus 1984). The prehistoric districts include two major settlement areas and a seasonal food gathering area. The historic district is an early Euro-American and Chinese Placer mining complex.

The Sites Reservoir Project is an example of off-stream pumped storage from the Sacramento River. Cultural resource impacts depend upon the alternative chosen since reservoir options for this site range from 1.2 to 3.3 MAF. Some inventory has been conducted for this reservoir area and 18 prehistoric sites, 13 historic sites, 3 ethnohistoric sites have been recorded. Chartkoff (1969) conducted an early inventory of this reservoir and describes complex midden bearing sites some of which contain housepits. Additional inventory is needed depending upon the alternative selected.

Nearly 30 reservoirs are being examined for possible construction or enlargement under the alternatives. Cultural resources will be affected because of the extent of surface disturbance.

5.1.2.3.3 Alternative 2

The impacts to cultural resources as a result of surface and ground water storage would be similar to those described for Alternative 1.

5.1.2.3.4 Alternative 3

The impacts to cultural resources as a result of surface and ground water storage would be similar to those described for Alternative 1.

5.1.2.4 San Joaquin River Region

5.1.2.4.1 Common Programs

Projects associated with the Ecosystem Restoration Program in the San Joaquin River Region may affect cultural resources. The program calls for a variety of habitat restoration actions as well as modification of existing fish screens and weirs to better protect fish species. The potential impacts to cultural resources from these actions include primarily minor and possibly moderate construction activity (Con\1,2). Site specific inventories and evaluations are needed to fully evaluate impacts from activities of the ecosystem restoration program.

5.1.2.4.2 Alternative 1

The San Joaquin River Region will experience impacts from Alternative 1. Options under this alternative call for surface storage of up to 1.0 MAF and ground water storage of up to 500 TAF (Table 3). New reservoirs represent significant surface disturbance with high construction impacts (Con\3) and impacts associated with flooding. Ground water storage offers some of the same impacts since percolating basins are needed, but the overall scope of such projects is less than a new or enlarged reservoir. This alternative has 10 possible reservoir sites.

The Montgomery Reservoir is a small facility that may become a portion of this alternative. It is an example of a potential facility where there has been no cultural resource information collected. This area, however, falls within the American River Water Resources Investigation study area (West, Welch, Hansen 1995). Prehistoric site density projections are available as a result of a GIS model developed for the study. Twenty-four prehistoric sites are predicted to be found within the affected area. Historic mining activity took place in the area, but historic sites are unknown. The actual number of sites requires a cultural resource inventory.

5.1.2.4.3 Alternative 2

Alternative 2 calls for smaller surface storage behind new or enlarged reservoirs when compared to Alternative 1. A maximum of 500 TAF is proposed. Ground water storage is the same as Alternative 1 at 500 TAF. One major difference between these two alternatives is the proposed use of off-aqueduct storage. One or several of eleven South-of-Delta aqueduct storage projects are possible with a maximum pool of 2.0 MAF. This form of water storage involves pumping water to existing or new facilities.

There are several examples of pump-storage reservoirs on the west side of the San Joaquin Valley. One such project has been inventoried for cultural resources and 35 prehistoric and 6 historic sites have been documented. The prehistoric sites included major habitation locations, temporary camps, flake and tool scatters, as well as milling stations. The historic properties consisted of the remains of early residences. Preliminary evaluation of these sites have been completed. Fifteen sites were considered clearly eligible, 19 were considered potentially eligible, but these needed further evaluation, and seven sites were considered clearly ineligible. Formal determinations of eligibility were never conducted and no properties were mitigated before the project was abandoned.

5.1.2.4.4 Alternative 3

Impacts for this alternative have been described above and the range of surface and groundwater storage facilities are similar to Alternative 2 (Table 3).

5.1.2.5 SWP and CVP Service Area

This program will not result in any direct impacts to the service areas. No structures, conveyance facilities, storage projects or habitat improvements are planned. There will be slight differences in the flows of water in some streams, but these changes will not affect cultural resources.

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AFFECTED ENVIRONMENT Cultural Resources

1.0 Executive Summary

Cultural resources consist of archeological and historic sites. The archeology and history of the region, as well as the Native peoples who occupied the study area at Spanish contact are discussed here. The Delta Region is emphasized since this area will be the focus of activity. Historic and prehistoric site locations for the legal Delta have been compiled in a geographical information system (GIS) format. Data for the other regions is presented with less detail.

The Information Centers of the California Historical Resources File System (Information Centers) at Sonoma State, Sacramento State, and Stanislaus State Universities provided cultural resource data for the Delta Region. Information for the remaining regions is taken and condensed from the Cultural Resources Technical Appendix prepared for the Central Valley Project Improvement Act Programmatic Environmental Impact Statement.

Legal Basis

The National Historic Preservation Act of 1966 (NHPA), as amended, and the National Environmental Policy Act of 1969, are important Federal laws applicable to the consideration of cultural resources. The Code of Federal Regulations (CFR) Title 36 Section 800 contains the process for consulting with the State Historic Preservation Office (SHPO) and the Advisory Council on Historic Preservation (ACHP) to ensure that significant historic properties have been considered in planning the project. The expenditure of Federal funds by state agencies or private organizations also triggers Section 106.

The criteria for determining site significance varies between state and Federal governments. At the Federal level the National Register of Historic Places (NRHP) lists significant historic properties (36 CFR 60). A property is eligible for or listed in the NRHP, if it meets one of four criteria for significance and retains integrity. The Bay-Delta Cultural Resource Technical Appendix discusses eligibility and other issues related to the NRHP.

The California Register of Historic Resources (CRHR) provides a parallel state process. The CRHR is mirrored after the federal NRHP. CEQA Statutes and Guidelines, Appendix K, Section III define an "important" archeological resource. The California Historic Landmarks and California Points of Historical Interest are programs that recognize important historic sites. State regulations protect historic properties. These include CEQA Appendix K, sections of the Public Resources Code, and the State Penal Code. Finally, local counties and cities have adopted policies, plans, and ordinances to protect cultural resources within their respective jurisdictions.

The National Environmental Policy Act (NEPA) is the primary environmental legislation for the country. NEPA regulations offer levels of review depending upon the project. These include environmental impact statements, environmental assessments, and categorical exclusion check lists.

The treatment of human remains is covered under both State and federal laws and regulations. The Archeological Resources Protection Act and the Native American Graves Protection and Repatriation Act apply only to federal lands. State law covers state, nonfederal public and private lands.

Delta Region: Historical Perspective Archeology

The Central California culture sequence is based on the stratigraphic differences based on funeral patterns, artifact types, and induration (Lillard et al. 1939). Three periods, or horizons, are recognized: the Early Period (now dated approximately 2500-500 B.C.), the Middle Period (500 B.C. to A.D. 300) and the Late Period (A.D. 300 to 1840). This has evolved into a new classification (Fredrickson 1974) which defines three major patterns: the Windmill, Berkeley, and Augustine.

The Windmill Pattern is known only from the eastern-Delta Comanche Reservoir area, and adjacent areas of the lower valley from the middle Cosumnes River to Stockton. This pattern, equivalent to the Early Period in this area, has distinctive burial patterns, diagnostic shell ornaments and stone tool forms. Considerable debate has focused on the subsistence base of these people (Gerow 1974; Heizer 1974; Schulz 1970, 1981).

The Berkeley Pattern is equivalent to the Middle Period in the lower Sacramento Valley, although earlier phases may be coeval with the Early Period in the Bay Area. The Berkeley Pattern is characterized by flexed burial positions, diagnostic ornaments, and, in the valley, by bone fish spears or leister points and stone pestles. The diet emphasized fish and acorns.

The Augustine Pattern corresponds to the Late Period in the lower Sacramento Valley. It is marked by the appearance of small projectile points, changes in funerary patterns and ornament styles. These cultures, in general, appear to be ancestral to the ethnographic groups of the same area (Bennyhoff 1961).

The Meganos Complex (Fredrickson 1974) deserves mention. This complex, assigned to the Middle and Late Periods is characterized by extended burials and by distinct cemeteries disassociated with midden areas. Such cemeteries are known particularly from the sand mounds of Jersey Island, Bradford Island, Bethel Tract, Hotchkiss Tract, and Holland Tract (Cook and Elsasser 1956). This complex shares the same dietary emphasis of the Berkeley Pattern.

Native Peoples

The native peoples of the Delta area were divided among five linguistic groups, all belonging to the Penutian language stock. The far northeastern part of the Delta region was occupied by the Valley Nisenan, the eastern part and far western part by Plains and Bay Miwok speakers, the southern part by the Northern Valley Yokuts, and the north shore of the Suisun Bay

area by the Patwin. Despite sharing the same environment, there were distinct material cultural differences among the five groups (Bennyhoff 1977:47).

The Plains and Bay Miwok are members of the Utian family of the Penutian stock languages (Shiple 1978). The boundaries and divisions of the Miwok is based largely on linguistic evidence (Bennyhoff 1977, Kroeber 1925, Levy 1978, Schenck 1926). The Miwok were intensive collectors; they occupied large, fixed, multilineage villages (tribelets) located on high ground generally adjacent to watercourses. Most villages were occupied permanently except during short periods of harvesting. Camps for fishing and hunting were also part of the settlement system.

The Northern Valley Yokuts were semi-sedentary, with principle settlements on low mounds or levees on or near the banks of major watercourses. Loosely centralized tribes headed by a chief (the position of which was inherited) were tied to one or more principle villages. Secondary settlements consisted of small camps or villages of several households. Next to settlements, there were fishing stations, hunting camps, and lithic-tool-manufacturing sites. The early disruption of Yokut-speaking people resulted in little ethnographic information (Bennyhoff 1977, Schenck 1926, Schulz 1981, Kroeber 1925.)

The term "Patwin" refers to several tribelets of people who occupied the west side of the Sacramento Valley extending from Suisun Bay north to just above the town of Princeton on the Sacramento River (Johnson 1978). Patwin tribelets generally occupied one primary and several satellite villages, some contained as many as 1,000 or more persons (Powers, 1976). Each tribelet had a sense of territoriality and autonomy (Johnson 1978). Subsistence, like that of their neighbors, was based on hunting, gathering, and fishing. Details on the lifeway of Patwin are little known because they were among the earliest groups in the region to be affected by missionization and introduced diseases. By 1871-1872, when Stephen Powers surveyed the state while gathering ethnographic information, the Patwin culture no longer existed.

The destruction of native Delta cultures was the result of several factors. Even before explorers and settlers made extensive contact, the missions drew Native Americans away from their villages. An 1833 epidemic, possibly malaria, killed thousands and numerous villages were abandoned. The secularization of the missions in 1834 affected native societies. Elimination of the mission system caused Native Americans of various cultural affinities to retreat into areas of previous cultural homogeneity (Wallace 1978). Final collapse of the Delta cultures occurred when, after the Gold Rush, waves of American settlers converted native territory into agriculture fields. Village mounds of the native peoples were abandoned, reoccupied by farmhouses, buried under levees, or leveled for agriculture.

History

The first non-native intrusion into the Delta region occurred in 1775, when a Spanish explorer named Carnizares entered Suisun Bay. Although the Spanish generally avoided the area, the Delta region was a haven for native peoples resisting Spanish Franciscan

missionization. With hope of creating stability in the interior, and to build a buffer zone for coastal areas, Land grants were awarded in the Delta region. Paso del Pescadero was granted in 1843. Other Mexican land grants extending into the area included Los Medanos (1835), Los Ulpinos (1844), and John Sutter's New Helvetia (1841) (Beck and Haase 1974, Hoover et al. 1990).

Settlement in the Suisun Marsh area began with the establishment of Suisun City in 1850. Major settlements clustered around the marsh's periphery. Vacaville was platted in 1851 and formally established in 1852 (Storey 1996). Establishment of the towns of Cordelia, Rio Vista, Fairfield, Rockville, and Vallejo soon followed. The intrusion of saltwater into the marsh led to abandoning agriculture.

Walnut Grove served as the center of social and economic life for many Chinese and Japanese seasonal agricultural workers. The Chinatown is known to have been established by 1885. By 1910, the Asian-American community included hotels; restaurants; and dry goods, drug, mercantile, and grocery stores (Ariki 1979:2). Other Asian-American communities flourished in Stockton, Isleton, Courtland, Locke, and Rio Vista and served as centers for the rural farm laborers. Other ethnic labor groups included Italians, East Indians, Filipinos and Portuguese. Today Mexicans and Mexican-Americans compose the largest ethnic labor group.

American entrepreneurs saw Delta peat soils as potential farmland. The majority of the lands in the Delta, however, were subject to periodic flooding. The Swamp and Overflow Land Act of 1850 opened up the land for speculation (Thompson and West 1879). By 1871, nearly all land had been sold (Owens 1991:19) with some farms exceeding 100,000 acres.

The Tide Land Reclamation Company, one of the first to operate in the Delta, partially reclaimed Union Island in 1872 (West 1996). During levee construction, gates were built to release water at low tide (Thompson 1957:275-276.). Farmers experimented with pumps powered by horses as early as the 1870s. These were quickly replaced by steam-driven machines, and by 1920 all pumps were electrical. Over the last 80 years, all the levees have been modified. None of the original levees remain intact.

Transportation around the Suisun Marsh during the early 1800s was primarily by water, although the Pony Express route skirted the edge of the marsh in 1860 and 1861 (Storey 1996). In addition to sail and steamships, small boats, barges, launches and schooners also provided access to the Delta. Fertys were used during the historic era. The Southern Pacific Railroad Company organized the Sacramento Southern Railroad Company (SSRR) in 1903 (Maniery 1992). The SSRR became a branch line feeder of the Southern Pacific system (State of California 1980:19). This line was mostly elevated (Maniery 1992) to protect against flooding. At least two of railroads lines have been determined eligible for the NRHP, the SSRR and a spur the Walnut Grove Branch Line.

The industries of canning, sugar refining, and brick making were attracted to the Delta region. The first cannery in the Delta region was established in Yolo County to pack salmon.

Although no physical remains are left, it is listed in NRHP as well as the California Inventory of Historical Resources. The asparagus boom was largely responsible for the canning industry in the Delta, but by 1940 most had ceased operations. Sugar refining was widespread in the 1870s. The California and Hawaiian Sugar Company, C & H Sugar, began in 1906. This company now operates in the Delta and produces more refined sugar in 3 weeks than was turned out in its entire first year of operation.

Brick manufacturing began as little more than a cottage industry, but between 1878 and 1895, two factories operated at Freeport and near Benson's Ferry. With kilns situated on the riverbanks and clay being obtained from nearby pits, the Freeport plant produced and shipped to San Francisco 2,000,000 bricks in 1878, and 4,500,000 the following year (Schulz and Farris 1994:60).

Delta Region: Current Resource Conditions Archeology

Relatively little systematic inventory of the Delta has been accomplished despite large-scale impacts from widespread agricultural development. Prominent prehistoric mounds attracted the interest of early archeologists and many sites were documented. Approximately 80% of the known prehistoric sites were recorded prior to 1960.

Late prehistoric sites are found along of the 1850 tidal line and on sandmounds within 10 feet of sea level. Approximately 90% of the sites in the study area are located beneath an elevation of 15 feet msl. The majority of sites are positioned in a band between sea level and 10 feet. The few radiocarbon dates available from prehistoric sites indicate that all date to less than 4500 years B.P., the upper two-thirds of the Holocene (Schulz 1981). Finding earlier sites is important because they might clarify the role that sea level changes and subsidence had in cultural development during the Holocene. Buried sites are present within the Delta Region.

The GIS mapping of recorded prehistoric sites shows that archeological sites are not evenly spread across the Delta Region. For example, although channel deposits, floodplains, and basins compose approximately 40% of the total acreage within the Delta, nearly 80% of prehistoric sites are located within these landforms. In contrast, those landforms identified as mucks; organic soils; and fans, basins, and terraces compose 25% of the study area landmass and contain less than 5% of the prehistoric sites. In fact, aside from isolates, no prehistoric cultural deposits have been reported in peat (>50% organics) or peaty mucks (25-50% organics). Tidal wetlands deserve special mention since they contain sand dunes and mounds that provided opportunities for prehistoric occupation.

The landscape of the Delta is different today than it was prior to of farmland reclamation. Reconstructed watercourses, areas presently and formerly subject to tidal influence, and other features of surface geology (Atwater 1982) were used as a basis for generating a predictive model of prehistoric settlement patterns in the south-Delta region (West 1994). Further mapping of extinct watercourses can help define areas of sensitivity for buried archeological sites. Age-

dating the sediments on which sites are found may be useful in predicting the location of same-period sites.

Native Peoples

No reservations or rancherias are located within the legal Delta. A review of the primary ethnographic literature for the Delta Region and contact with the Native American Heritage Commission found no traditional properties or sacred sites.

Historic Resources

Potential historical resources in the study area are largely related to agriculture; however, other types of resources are also present including farmsteads, labor camps, landings for the shipment of agricultural produce, canneries, pumping stations, siphons, canals, drains, unpaved roads, bridges, and ferry crossings. Forty known historic sites are on top of prehistoric sites. Labor camps generally consisted of at least one wooden bunkhouse or boarding house, dining hall, cookhouse, washroom, and associated buildings. Landings, for the most part, were not elaborate, consisting of a few pilings or a dolphin. At least three ferry crossings were present in the study area.

Bay Region: Historic Perspective Archeology

The earliest known occupation of the San Francisco Bay area took place by approximately 8000 B.C. Several radiocarbon dates from sites throughout the Bay Area indicate that populations of hunter-gatherers were sparse by approximately 5000 B.C. This Archaic Period is characterized, like the Sur Pattern identified in the Monterey area, by generalized hunting and gathering subsistence. Midden deposits contain a wide variety of faunal remains, but shell is only a minor constituent.

By approximately 2500 B.C., the Berkeley Pattern appears in the east Bay Area. It has been hypothesized that the Berkeley Pattern "represents Utian (Miwok-Costanoan) cultural developments and geographic spread throughout the Bay and northern Central Coast regions. Old Berkeley Pattern components share many traits with those of the Windmill Pattern, suggesting a common origin" (Moratto, 1984). It is believed that there was continuous occupation by Costanoan people for more than 2,000 years (Moratto, 1984).

Native Peoples

The Costanoans are a linguistically defined group composed of several autonomous tribelets speaking eight different, but related, languages. The Costanoan languages, together with Miwok, compose the Utian language family of the Penutian stock (Levy, 1978a). The territory of the Costanoan people extended along the coast from San Francisco Bay in the north to just

beyond Carmel in the south and approximately 60 miles inland (Breschini et al., 1983). Information about the Costanoans has been summarized by Levy (1978a).

The Costanoans were hunter-gatherers, relying heavily on acorns and coastal resources. However, a wide range of other foods was also exploited. These sources included various seeds (growth was promoted by controlled burning), buckeye, berries, roots, land and sea mammals, waterfowl, reptiles, and insects. Tule balsas for watercraft, bows and arrows, cordage, sea otter blankets, and twined basketry were made (Levy, 1978a), as was the usual range of lithic and bone tools. In Costanoan religion, prayers and offerings were practiced, as were shamanism and witchcraft. Marriages were polygamous, households were generally composed of patrilineally extended families, and clans and moieties were the basis for group identification.

In 1770, the time of the establishment of the first mission in Costanoan territory, the population numbered an estimated 10,000, but it declined to less than 2,000 by 1832 because of introduced disease and a decreased birth rate (Levy, 1978a). Missionization of the Costanoans virtually destroyed these people.

Historic Resources

The San Francisco Bay Region is characterized by urban and suburban development since the mid-1800s. The area has been a major shipping, manufacturing, military, and commercial center for all of northern California since the 1860s. Historic/architectural resources are related to the settlement of the region and include economic/industrial facilities, residential properties, commercial establishments, military installations, and government facilities.

Bay Region: Current Resource Conditions

Archeology

Considerable industrial and residential development in this region has taken a toll on archeological resources. Prehistoric sites have been destroyed by urban development and by industrial construction. Archeological sites remain in areas that have not been fully developed. Sites can also found capped under asphalt and below buildings.

Native Peoples

There are no formal reservations or rancherias present within the Bay Region. There are a number of Native Americans who live in the area. Mount Diablo is a well known land mark that holds mythic importance to the Costanoans (Kroeber 1925:472) as part of one of their creation myths.

Historic Resources

Numerous historic properties are recognized as historically significant under state and Federal programs. The CVPIA Technical Appendix reports that in 1994 the Bay Region counties

contained a combined 724 prehistoric and historic sites, although many of these lie outside the region. Properties listed in the NRHP total 407. Many of these are historic buildings located in urbane areas. There are 176 California Historical Landmarks in the same area. Active historic preservation programs, societies, and organizations are found in the Bay Region.

Sacramento River Region: Historical Perspective Archeology

The northern Sierra Nevada foothills appear to have been first used by Great Basin people around 6000 B.C. By approximately 2000 B.C., people were seasonally hunting and gathering in the higher elevations and apparently also extended well into the Sacramento Valley. Their material culture has been termed Martis. Four additional prehistoric phases or complexes comprise the archeological sequence for this area based on settlement patterns, projectile point forms, and other artifacts. The Mesilla Complex (approximately 1000 B.C. to A.D. 1), Bidwell Complex (A.D. 1 to 800), Sweetwater Complex (A.D. 800 to 1500) and finally the Oroville Complex (A.D. 1500 to 1833) represent the chronology for this area. The epidemic of 1833 marks the end of the Oroville Complex.

The earliest occupants for the west side of the Sacramento River Region are believed to have been Hokan speakers whose material culture closely resembled the assemblages of the Borax Lake and Mendocino complexes dating to a similar time period (ca 4500 B.C. to A.D. 200). Large, wide-stemmed projectile points, manos, and milling stones are frequently encountered artifactual types.

Some time by approximately A.D. 200, Penutian-speaking people entered the region and eventually displaced the Hokan occupants in many areas. The archeological expressions of this late prehistoric period in Yana territory are represented in the Mill Creek and Dye Creek complexes (Dondero et al., 1982), contemporary with the Shasta Complex. Sundahl (1982) distinguishes Tehama Pattern peoples (Yana Indians) from Augustine Pattern peoples (Shasta Complex, ancestors of the ethnographic and historic Wintu Indians).

Native Peoples

Seven Native American groups occupied the general area of the Sacramento River Region. These groups are divided into two language stocks. The Wintuan and Maiduan Linguistic Families are derived from the Penutian Language Stock. The Maidu, Konkow, and Nissenan speak variation of the Maiduan Family, whereas the Wintun, Nomlaki, and Patwin are separated into the Wintuan Family. The patwin are briefly described in the Delta Region. The Yana, found in the north east portion of this region, speak a language derived from Hokan Stock (Shipely 1978).

The Maidu (also known as northeastern Maidu), Konkow (also known as northwestern Maidu), and Nissenan (also known as southern Maidu) inhabited an area of California from Lassen Peak to the Cosumnes River, and from the Sacramento River to Honey Lake. The

division of these three groups is based on language differences and geographic location. Politically, the Maidu, Konkow, and the Nisenan were organized around the tribelet. Each tribelet was composed of several villages, and when needed for group decisions or group activities, the headman of one of the villages in a tribelet was selected to be the leader.

The subsistence strategy of the Maidu, Konkow, and the Nisenan involved seasonally mobile hunting and gathering. Acorns, the primary staple, were gathered along with seeds, buckeye, salmon, insects, and a wide variety of other plants and animals. Because their territory was largely a mountainous one, these groups relied more heavily on hunting than did the other people.

Politically, the Maidu, Konkow, and the Nisenan were organized around the tribelet. Each tribelet was composed of several villages, and when needed for group decisions or group activities, the headman of one of the villages in a tribelet was selected to be the leader. The histories of these groups closely parallel one another and other native groups in California.

The western side of the Sacramento River Region north of Suisun Bay was inhabited by Wintuan-speaking people. Linguistic analysis has divided these speakers into the Patwin (a southern group), Nomlaki (central group), and Wintu (northern group). The central and northern groups closely related to one another and are combined for this discussion.

Wintu and Nomlaki subsistence was based on three main staples: deer, acorns, and salmon. All three were abundant within the western Sacramento Valley. These staples were supplemented with an immense array of less abundant resources, some seasonally available and some procurable year-round. Deer constituted a major dietary staple that were hunted individually and communally (Du Bois, 1935). The acorns of black and valley oak were preferred. Salmon has been used to assess prehistoric population levels (Baumhoff, 1963). Salmon is a determinant of site distribution (Raven et al., 1984). Other food resources include a wide range of mammals, birds, reptiles, fish, shellfish, and plants,

The Nomlaki and Wintu were greatly affected by the 1833 malaria epidemic and they never overcame the devastating effects of this epidemic. Following the arrival of miners and settlers, the Nomlaki and Wintu suffered further reductions in population. Eventually, survivors were moved to reservations and camps. By the 1930s, there were three Nomlaki rancherias of six households each, with the men serving primarily as casual or migratory laborers (Goldschmidt, 1978).

The Yana were hunter-gatherers who relied heavily on the acorn crop, their primary food source. Other important food resources included deer, bear, antelope, elk, salmon, rabbits, quail, insects, rodents, river mussels, various roots, tubers, bulbs, seeds, buckeyes, pine nuts, and berries. The Yana material culture includes a wide range of tools made from bone, antler, wood, and stone. Baskets were made, but they were apparently of relatively poor quality. Tribelets served as the principal political organization.

The first European contact of the Yana may have occurred as early as 1821, when a mission-military expedition entered their territory. Overall, mining and settlement had little effect on the Yana. However, in 1846, Captain Fremont attacked and killed several Yana. The ensuing years brought several massacres, which resulted in the nearly total elimination of the Yana-Yahi people.

History

Settlement of the Sacramento River Region is characterized by agricultural development on the valley floor and by mining in the Sierra Nevada foothills. Agricultural activities are based on the establishment and development of commercial crops, accessibility to markets, new farming techniques, and irrigation. Agriculture has been important in the region since the late 1800s after failed miners searched for alternative income.

Mining activities in the region are related to the discovery of gold at Sutter's Mill along the South Fork of the American River in 1848. Initially armed with pans and picks, miners later used powerful hydraulic hoses to search for gold. Major gold mining activity took place along most rivers flowing from the Sierra.

The economy of the Sacramento River Region has been based on mining, agriculture, and government services since the late 1800s. Historic resources are related to the settlement of the region and include mining features, homesteads, economic/industrial facilities, residential properties, commercial establishments, and government facilities.

Sacramento River Region: Current Resource Conditions

Archeology

The massive agricultural development and urban development of the valley floor has significantly damaged many archeological sites. Prehistoric mounds have been leveled, sites have been repeatedly disced and plowed in agricultural fields. Yet, intact archeological deposits may occur in buried contexts, beneath the plow zone, or under asphalt parking lots.

The foothill regions of the Sacramento River Region contain undeveloped areas where archeological and historic sites are found. Acorn processing sites are commonly found in the oak woodland. According to a site density model prepared for the American River Water Resources Investigation (West, Welch, and Hansen 1995), the foothills and granite-based upland areas contain a projected 3.5 and 2.8 sites per square mile. Habitation sites and bedrock mortar or other milling sites are the most common types found in these areas.

Native Peoples

There are 19 reservations or rancherias in the counties that comprise the Sacramento River Region. Some of these reservations may fall outside the boundaries of the study area. There are also an unknown number Public Domain allotments within the region.

Many natural or geologic features are traditionally considered sensitive or sacred. As examples of the sacred natural landscape, the Konkow and the Maidu considered Sutter Buttes as the location from which spirits of the dead left for the afterworld (Kroeber 1925: 439). Butte Mountain is the site of the first Hesi ceremony performed by ancestors of the Nisenan. The Nomlaki considered Lassen Butte as the home of a mythical figure (Curtin 1898). Marysville Buttes and Mount Shasta are places of mythical importance to the Patwin (Kroeber 1932) and Wintu, respectively.

Historic Resources

Many sites are recognized as historically significant under the state and Federal programs. The CVPIA Cultural Resource Technical Appendix reports that in 1994 there were 452 historic and prehistoric properties in the counties the form the Sacramento River Region. The NRHP has 294 properties while there are 224 California Historical Landmarks. Many of these properties fall outside areas of potential impact.

San Joaquin River Region: Historical Perspective Archeology

The sequence for the east side begins some 9,600 years ago and is characterized by hunters and gatherers who used distinctive stemmed spear points. The Chowchilla Phase, the next described archeological culture, dates from 800 B.C. to A.D. 550 and is characterized by fish spears, large projectile points, milling stones, various shell beads and ornaments, and atlatl darts. Extended and semi-extended burials with large quantities of grave goods are also associated with this phase. The Raymond Phase, (A.D. 300 to 1500) and the Madera Phase (A.D. 1500 and 1850) are distinguished by milling stones, core tools, projectile point types, and various shell ornaments. The later Madera Phase is noted for bedrock mortars and imported ceramics as well as cremations in addition to flexed burials.

The sequence for the west side begins with the aforementioned Windmill Pattern. Work at the San Luis Reservoir (Olsen and Payen 1969, 1983; Pritchard 1970) produced chronological descriptions. The Positas Complex (5,250 to 4,550) includes cylindrical pestles, milling slabs, mullers, "doughnut stones", and other chipped stone tools (Olsen and Payen 1969). The Pacheco A Complex (approximately 3,550 to 1,650 years ago) includes beads, abalone ornaments, distinctive bone artifacts, polished stone objects, mortar and pestle, rectangular milling slabs, mullers and stemmed or side-notched projectile points (Olsen and Payen 1969).

Late prehistoric archeology is represented by the Gonzaga Complex (1,650 to 950 years ago). Burials from this time period are predominately extended with some semi-flexed inhumations. Artifacts include a variety of beads types, bone tools, ear plugs, large bowl mortars, slab milling stones, and mullers. Projectile points are rare. The Panoche Complex (450 to 150 years ago), holds relationships with the south as well as the Sacramento-San Joaquin Delta (Haversat and Breschini 1985). The Gonzaga and Panoche Complexes fall within the Augustine Pattern era.

Native Peoples

The Yokuts and Miwok peoples once found in the San Joaquin Valley Region are described in the Delta ethnographic section. One other group merits mention for this region. The Monache, or Western Mono, represent six separate, but linguistically affiliated groups.

The Monache are generally distinguished from the Foothill Yokuts by language and location, rather than by cultural traits. The Monache language is classified within the Numic family, or Uto-Aztecan stock, found in California only with the Monache and Eastern Mono.

In general, the Monache lived on the west slopes of the Sierra Nevada, between 3,000 and 7,000 feet elevation. Monache groups were seasonally mobile hunter-gatherers. Acorns, their dietary staple, were stored for the winter. A wide range of other plant and animal resources were also used. The Monache produced twined basketry (including cradles), steatite cooking vessels, and ceramic vessels (coil method, fired) besides the usual array of lithic and bone implements.

Historic Resources

The San Joaquin River Region is characterized by both agricultural settlement and mining. Agricultural development encompass the entire floor of the valley and was started by failed miners. Mining activities are related to the gold rush of the late-1800s and the subsequent commercial extraction of ore. The economy of the east side of the region has been based on mining, agriculture, and commercial services since the late 1800s. Historic resources are related to the settlement of the east side of the region and include mining features, homesteads, economic/industrial facilities, residential properties, commercial establishments, and government facilities.

San Joaquin River Region: Current Resource Conditions **Archeology**

This region is similar to the Sacramento River Region since vast agricultural development has destroyed many prehistoric sites. Remnants of prehistoric sites still occur in agricultural lands, but they have been highly disturbed. Prehistoric sites are found along the San Joaquin River and its associated sloughs. Buried sites are possible in this area due to the high rate of sedimentation. Finding such resources is problematical.

Native Peoples

There are eight reservations or rancherias in the counties that comprise the San Joaquin River Region, although some of these reservations may fall outside the boundaries of the region. There are also an unknown number Public Domain allotments within the region. The Monache have several places of mythological importance. Table Mountain near Friant were visited by mythical beings (Gifford 1923).

Historic Resources

Many sites are recognized as historically significant under the state and Federal programs. The CVPIA Cultural Resource Technical Appendix reports that in 1994 there were 255 historic and prehistoric properties in the counties the form the San Joaquin River Region. The NRHP has 156 properties while there are 111 California Historical Landmarks. Many of these properties fall outside areas of potential impacts.

2.0 Introduction

The purpose of this technical report is to provide a description of the affected environment for cultural resources. In order to accurately describe the affected environment for cultural resources it will be necessary to define not only current conditions but also historic conditions. The historic conditions place current conditions in perspective. This report describes the relevant regulatory context, historical cultural resource trends, and existing cultural resources for the study area. The current and historic conditions will be described in this report for each of the five regions within the study area: Delta Region, Bay Region, Sacramento River Region, San Joaquin River Region, and the SWP and CVP Service Areas. The executive summary contained in this technical report in conjunction with other information, data, and modeling developed during prefeasibility will be used to prepare the affected environment section of the Programmatic Environmental Impact Report/Environmental Impact Statement (EIR/EIS).

Cultural resources consist of archeological and historic sites. The archeology and history of the region, as well as the Native peoples who occupied the study area at Spanish contact are discussed here. An emphasis is placed upon the Delta Region since this will be the focus of activity. Historic and prehistoric site locations for the legal Delta have been compiled in a geographical information system (GIS) format. This provides the basis for predicting site locations based on landforms and elevation. Data for the other regions is presented with less detail.

3.0 Sources of Information

The Delta Region, along with the adjacent areas of the Central Valley, compose one of the most intensely investigated areas in the archeology of California. Because of its position at the geographical center of the State, as a rural region conveniently accessible from urban centers, and as a zone of high prehistoric population density, the Delta has attracted archeological interest for more than a century (Belding 1882, Davis 1907, Holmes 1902, Kroeber 1929, Schenck and Dawson 1929).

Large-scale systematic excavations were initiated in the 1930s by Sacramento Junior College and the University of California (Lillard et al. 1939). Recent topical reviews have been presented in Dorn (1980), Heizer (1974), and Schulz (1981). Johnson (1976) summarized the numerous studies of prehistoric sites conducted in the Cosumnes drainage. Subsequently, he and his students have added a considerable volume to the area's database. For the upper Mokelumne,

Maniery (1991) reviewed the prehistoric and historic database and produced a summary report. Parts of several Delta islands were recently surveyed for prehistoric and historic cultural resources as part of a water storage study (Maniery and Syda 1988). Several documents have summarized the history of the region, particularly Maniery (1993), Paterson et al. (1978), Owens (1991), Schulz and Farris (1994), Thompson (1957), U.S. Bureau of Reclamation (1996), Walker (1992), and Waugh (1985).

These studies were reviewed to provide the prehistoric and historic context of Delta study area. To assess cultural resource distribution in the Delta, information was obtained from the State Office of Historic Preservation and the Information Centers of the California Historical Resources File System (Information Centers) at Sonoma State, Sacramento State, and Stanislaus State Universities.

Information for the remaining regions is largely taken and condensed from the Cultural Resources Technical Appendix prepared for the Central Valley Project Improvement Act Programmatic Environmental Impact Statement. Site locational information for regions beyond the Delta was not collected from Information Centers for this appendix.

4.0 Environmental Setting

4.1 Study Area

4.1.1 Delta Region

The Delta Region includes the legal Delta, Suisun Resource Conservation District, Suisun Bay, and the area south of Suisun Bay bounded by State Routes 680 and 4.

The study area has been used by prehistoric and historic settlements dating back 4,500 years. Prior to 1850, before significant human modification, the Delta consisted of intertidal wetlands laced with about 100 square kilometers of subtidal waterways. Both prehistoric and early historic settlement occurred primarily adjacent to natural waterways. Historic exploration, use, and settlement of the study area began with several Spanish expeditions in the 1770s. Many other important historic-period events and activities (e.g., land grants, the gold rush, and land reclamation) have influenced the cultural history of the Delta region.

4.1.2 San Francisco Bay Region

The San Francisco Bay Region includes all of Marin, San Francisco, San Mateo, Santa Clara, and Alameda counties and a portion of Contra Costa County. The region contains deep water and salt marsh environments. It is marked, however, by extensive urban, commercial, and industrial development.

4.1.3 Sacramento River Region

The Sacramento River Region consists of all or portions of Amador, Butte, Colusa, El Dorado, Glenn, Napa, Nevada, Placer, Sacramento, Shasta, Solano, Sutter, Tehama, Yolo, and Yuba counties. The Sacramento River divides this region into the east side and west side.

This region is rich in historic and prehistoric-period resources. Considerable archeological research has been conducted in the area, including early work defining central California's prehistory. Of particular importance are the large, deep midden sites, which provide information on prehistoric culture extending over thousands of years. In the foothills, middens, lithic scatters, and bedrock mortars predominate. Historic archeological sites and architectural resources are plentiful because this area was settled early in California's history. As in other areas in the Central Valley, resources related to agricultural development are prevalent.

4.1.3 San Joaquin River Region

The San Joaquin River Region consists of all or portions of Calaveras, Fresno, Madera, Mariposa, Merced, San Joaquin, Stanislaus, and Tuolumne counties. The San Joaquin River and Fresno Slough divide this region into eastern and western subregions.

The valley floor of this region contains many of the same type of historic and prehistoric-period resources found in the southern Sacramento Valley. In the foothills, the numerous prehistoric sites reflect a wide variety of occupational and resource procurement activities. Historic sites are primarily related to mining, settlement, and agricultural pursuits.

4.2 Regulatory Context

The most important federal laws applicable to archeological and historic resources are the National Historic Preservation Act of 1966, as amended, and the National Environmental Policy Act of 1989, and regulations associated with them, particularly the Code of Federal Regulations (CFR) Title 36 Section 800. These statutes and regulations, as well as others that apply to cultural resources (e.g., Public Law 93-291), include a consultation process with the State Historic Preservation Office (SHPO) and the Advisory Council on Historic (ACHP) Preservation to ensure that potentially significant historic resources have been adequately considered in planning the project.

National Register of Historic Places

The National Register of Historic Places (NRHP) has been established by statute to list historic properties deemed to have historical significance (36 CFR 60). According to 36 CFR 60, cultural resources are considered significant if districts, sites, buildings, structures, and objects are of significance in American history, architecture, archeology, engineering, and culture and possess integrity of location, design, setting, materials, workmanship, feeling, and/or association, and:

- (a) are associated with events that have made a significant contribution to the broad patterns of our history; or
- (b) are associated with the lives of persons significant in our past; or
- (c) embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, possess high artistic values, or significant and distinguishable entity whose components may lack individual distinction; or
- (d) have yielded, or may be likely to yield, information important in prehistory or history.

A property is eligible for listing in the NRHP or may be listed in the NRHP, if it meets one of the above criteria for significance and it retains integrity. Integrity is defined as the "authenticity of a property's historic identity, evidenced by the survival of physical characteristics that existed during the property's historic or prehistoric period (National Park Service 1982)." NRHP-eligible properties must retain at least two of seven types of integrity, including integrity of location, design setting, materials, workmanship, feeling, and association. Properties may be determined eligible under national, state or local levels of significance.

Any federal action that could affect an historic property listed on or eligible for listing on NRHP is subject to review and comment under Section 106 of the National Historic Preservation Act (NHPA). Affects to these historic properties must be considered in accordance with the regulations of ACHP (36 CFR 800). Insignificant cultural remains usually do not require management consideration unless they possess the qualities specified by the California Environmental Quality Act (CEQA) or other laws.

The National Environmental Policy Act (NEPA) is the primary environmental legislation for the country. NEPA declares that it is a national policy to consider the effects of Federal undertakings on the environment. The law establishes an environmental ethic for Federal agencies to work within. The regulations of NEPA offer various levels of environmental review depending upon the complexity or the controversy of a particular project. Environmental impact statements, environmental assessments, and categorical exclusion check lists are documents prepared under NEPA.

National Historic Landmark

The National Historic Landmark (NHL) was established by the Historic Sites Act of 1935. An NHL can be a district, site, building, structure, or object that the Secretary of the Interior has determined possess exceptional value in commemorating or illustrating the history of the United States. NHL properties are significant at the national level and are automatically placed on the NRHP. The National Park Service manages this program.

State Programs

The most important State regulations providing for the protection of historic properties, including prehistoric and historic archeological resources, is contained within CEQA Appendix K (14 California Administrative Code, Section 15000 et seq.), which outlines procedures appropriate for the protection and preservation of such resources. Sections of the Public Resources Code (Sec. 5025, 5024.5, 5097.5, 6313) prohibit unauthorized disturbance or removal of archeological or historical resources that are to be altered. The State Penal Code (Section 622.5) applies to objects of historical or archeological interest located on public or private land and, specifically exempting the landowner, provides penalties for damaging such objects. Special state designations for cultural resources include the following.

California Historical Landmarks

The California Historical Landmarks program recognizes properties that are of statewide historical importance to California. Historical Landmark registration recognizes the following historical influences: anthropological, cultural, military, political, architectural, economic, scientific and technical, religious, and experimental. Properties that have been designated California Historical Landmarks 770 and higher are automatically included in the California Register of Historical Resources (CRHR).

California Points of Historical Interest

The California Points of Historical Interest recognizes properties and localities that are of local, city, or county interest. The criteria for designation are generally the same as those used for the state Historical Landmarks program.

California Register of Historical Resources

The CRHR provides a parallel state process for identifying and evaluating cultural resources. The register represents a comprehensive listing of California's historical resources. The CRHR places a greater emphasis on local values in assessing significance. The CRHR significance criteria is mirrored after the federal NRHP. Also currently in effect at the state level are the CEQA Statutes and Guidelines, Appendix K, Section III, which define an "important" archeological resource.

More recently, the California Register of Historical Resources (Office of Historic Preservation 1994) has defined site significance using criteria closely paralleling those for eligibility to NRHP; however, the guidelines for implementation of these criteria have not been formally issued.

Other Laws

Treatment of human remains is covered under both State and federal laws and regulations. The Archeological Resources Protection Act (except for interstate transport) and the Native American Graves Protection and Repatriation Act are specific to federal lands; State law covers State, nonfederal public and private lands. The California Health and Safety Code (Section 7052) prohibits the disturbance of human remains except under certain conditions and also specifies procedures, including consultation with the California Native American Heritage Commission, to be followed in the event that Native American graves are found.

The American Indian Religious Freedom Act (42 USC 1996) sets forth a governmental policy that federal agencies consider the consequences of their decisions on Native American religious practices.

In addition, local counties and cities have adopted policies, plans, and ordinances to protect cultural, historic, and archaeological resources within their respective jurisdictions.

4.3 Delta Region

4.3.1 Historical Perspective

4.3.1.1 Archeology

The use and occupation of the study area by native peoples depended, in large part, on the natural setting and conditions. Prior to 1850, before significant human modification, the Delta consisted of intertidal wetlands laced with about 100 square kilometers of subtidal waterways (Atwater and Belknap 1980). Floodplains of tributary rivers, mainly the Sacramento, San Joaquin, and Mokelumne, merged with these tidal environments, producing supratidal channels within the Delta and seasonally converting many tidal wetlands into alluvial flood basins. It was primarily along the channel banks that both prehistoric and early historic settlement occurred. Additional areas of relatively high ground are the relict aeolian sand mounds scattered throughout the Delta. These were used for burial, resource procurement, and habitation sites by prehistoric populations and, later, by settlers. The Piper series soils (Cosby 1941) are representative of some of the aeolian deposits. Many of the sand deposits are strongly indurated, suggesting considerable age. Atwater (1982) dated the dunes on Bradford Island at from 10,000 to 14,000 years old; elsewhere in the Delta, dune deposits dated to a minimum of 7,000 and an approximate maximum of 40,000 years B.P.

The Mokelumne River is the largest of the San Joaquin River tributaries, contributing about 22% of the entire San Joaquin Valley runoff. The result of this large amount of runoff is an alluvial fan that deflects the Sacramento River to the west. Schenck and Dawson (1929) noted that this interaction was significant in the interpretation of the area's archeology. The distribution, density, and age of the prehistoric sites is consistent with their contention (Pierce 1988).

The Central California culture sequence is based on the stratigraphic position of culturally distinct components, recognized on the basis of recurring funeral patterns, artifact types, and induration (Lillard et al. 1939). Three periods, or horizons, are recognized: the Early Period

(now dated approximately 2500-500 B.C.), the Middle Period (500 B.C. to A.D. 300) and the Late Period (A.D. 300 to 1840). This sequence has proven extremely useful, particularly because many of the temporally diagnostic artifact types are distributed widely and contemporaneously throughout Central California and neighboring areas.

Marked cultural differences between localities have occurred at various times, differences which are not reflected in the temporal sequence. Consequently, attempts have been made to classify the cultural complexes of Central California independently. The most acceptable classification thus far is that of Fredrickson (1974), which defines three major patterns: the Windmill, Berkeley, and Augustine.

The Windmill Pattern is known only from the eastern-Delta Comanche Reservoir area, and adjacent areas of the lower valley from the middle Cosumnes River to Stockton. This pattern is equivalent to the Early Period in this area and is characterized by extended, westerly oriented burial positions, degree of weathering and induration, and diagnostic shell ornaments and stone tool forms. Considerable debate has focused on the subsistence base of these people, including whether they processed acorns (Gerow 1974; Heizer 1974; Schulz 1970, 1981).

The Berkeley Pattern is equivalent to the Middle Period in the lower Sacramento Valley, but earlier phases may be coeval with the Early Period in the Bay Area. The Berkeley Pattern is characterized by flexed burial positions, diagnostic ornaments, and, in the valley, by the proliferation of bone fish spears or leister points and stone pestles. This appears to correspond with an increasing dietary emphasis on fish and acorns.

The Augustine Pattern corresponds to the Late Period in the lower Sacramento Valley. It is marked by the appearance of small projectile points, indicating the introduction of the bow, and by changes in funerary patterns and ornament styles. These cultures, in general, appear to be ancestral to the ethnographic groups of the same area and Bennyhoff (1961) has been able to correlate areal distribution of archeological artifact styles in these late groups with historic linguistic boundaries.

The Meganos Complex (Fredrickson 1974) is an additional culture pattern to be noted. This complex has been assigned to the Middle and Late Periods in the lower San Joaquin Valley and the western Delta, and is characterized by frequent extended burials without predominate orientation and by distinct cemeteries disassociated with midden areas. Such cemeteries of the Middle Period are known particularly from the sand mounds of Jersey Island, Bradford Island, Bethel Tract, Hotchkiss Tract, and Holland Tract (Cook and Elsasser 1956). It is apparent that these mounds, which can now be excavated only with great difficulty, have consolidated since the internments were made. Sites of this complex share the fishing/acorn dietary emphasis of the Berkeley Pattern.

4.3.1.2 Native Peoples

The native peoples of the Delta area were divided among five linguistic groups, all belonging to the Penutian language stock. The far northeastern part of the Delta region was occupied by the Valley Nisenan, the eastern part and far western part by Plains and Bay Miwok speakers, the southern part by the Northern Valley Yokuts, and the north shore of the Suisun Bay area by the Patwin. Despite sharing the same environment, there were distinct material cultural differences among the five groups (Bennyhoff 1977:47). For example, the Plains Miwok used wooden mortars, whereas their Delta neighbors, the Yokuts, used stone mortars.

The Plains and Bay Miwok are members of the Utian family of the Penutian stock languages (Shipley 1978). The boundaries and divisions of the Miwok in this area, and delineation into groups, is based largely on linguistic evidence (Bennyhoff 1977, Kroeber 1925, Levy 1978, Schenck 1926). The Miwok were intensive collectors; they occupied large, fixed, multilineage villages (tribelets) located on high ground generally adjacent to watercourses. Most villages were occupied permanently except during short periods of harvesting. Camps for fishing and hunting were also part of the settlement system.

There has been some dispute over the exact boundaries and divisions of the Northern Valley Yokuts and Miwoks in the Delta. Distinguishing between groups is based largely on very limited and problematic historical and linguistic evidence (Bennyhoff 1977:127, Schenck 1926, Kroeber 1925, Wallace 1978). Moraga recorded the location of the change from Yokuts to Miwok language at the Mokelumne River when he led the first Spanish expedition into Plains Miwok territory in 1806. The approximate area of the Nochochomne-Cholbon Yokut tribelets habitat was between the San Joaquin River on the east, the Old River (western channel of the San Joaquin River) on the west, south of the confluence of the three main channels on the north, and to about the point of trifurcation of the channels in the south (Bennyhoff 1977). The native population was not evenly distributed; it was clustered in a narrow strip of land bordering the San Joaquin River and its main tributaries (Wallace 1978). Baumhoff (1963) estimated a density of 10+ persons per square mile along the waterways, which is congruent with Schenck's (1926) estimate for the Delta marshlands. Schenck estimated that villages averaged about 200 persons each and were located 5-10 miles apart along the main rivers. Based on historical records Cook (1955) estimated that the area contained four or five settlements with a combined population of 1,300 persons. In 1811, Fr. Ramon Abella noted three rancherias (settlements) with a population of 900, or 300 per rancheria (Cook 1955). Considering the 200 or so Native Americans missionized from the area, Cook concluded that the aboriginal population was 1,500 or greater.

The Northern Valley Yokuts were semisedentary, with principle settlements on low mounds or levees composed of sand, silt, and clay on or near the banks of major watercourses. Loosely centralized tribes headed by a chief (the position of which was inherited) were tied to one or more principle villages. Secondary settlements consisted of small camps or villages of several households. Settlement locations appear to be in response to subsistence resources and protection from winter and spring flooding. Security also may have been a factor but direct evidence is lacking. Settlement groups broke up seasonally to exploit other resources, such as acorns, as they became available within a well-defined territory for fishing, gathering, and hunting. Settlements contained dome-shaped houses and shelters made of brush and tules.

Archeological data indicate that human internments were made at Delta settlements and cemeteries. Next to settlements, there were fishing stations, hunting camps, and lithic-tool-manufacturing sites. All lithics had to be imported.

Fish, fowl, acorns, and tule roots were the primary Northern Valley Yokut subsistence resources. In addition, other resources, such as freshwater bivalves, small mammals, seeds, and bulbs, were important. Elk, deer, and antelope, although reported abundant and easily hunted by the early explorers, probably constituted a marginal subsistence resource. (Wallace 1978.)

Because of the early disruption of Yokut-speaking people, little ethnographic information is available except for some demographic data recorded by explorers and missionaries and some linguistic description. (Bennyhoff 1977, Schenck 1926, Schulz 1981, Kroeber 1925.)

"Patwin" refers to several tribelets of people who occupied the west side of the Sacramento Valley extending from Suisun Bay north to just above the town of Princeton on the Sacramento River (Johnson 1978). The Patwin, like the Nisenan, Miwok, and Yokuts, have been classified as belonging to the Penutian language family; however, Patwin does not indicate a political unity; it was a term used by several tribelets in reference to themselves (Johnson 1978). Patwin tribelets generally occupied one primary and several satellite villages and each had a definite sense of territoriality and autonomy (Johnson 1978). Subsistence, like that of their neighbors, was based on hunting, gathering, and fishing. Details on the lifeway of Patwin who occupied the northern shore of the Suisun Bay area are little known because they were among the earliest groups in the region to be affected by missionization and introduced diseases. Bennyhoff (1977) identified the Patwin tribelet of Tolenas in the Suisun Marsh area.

The destruction of native Delta cultures was the result of several factors, the first of which was the effect of missions in northern California (Castillo 1989). Even before explorers and settlers made extensive contact, the missions of San Jose, Santa Clara, and others were drawing Native Americans away from their native villages. A second factor was the introduction of exotic diseases by European settlers. This factor was especially devastating in 1833, when thousands were killed by an illness, possibly malaria, and numerous villages were abandoned. A third factor that disrupted native societies, was the secularization of the missions in 1834. This caused many missionized Native Americans of various cultural affinities, seeking refuge from Europeans, to retreat into areas of previous cultural homogeneity (Wallace 1978). The final collapse of independent Delta cultures occurred when, after the Gold Rush, waves of American settlers appropriated native territory for agriculture. Meanwhile, village mounds of the native peoples were abandoned, reoccupied by farmhouses, buried under artificial levees, or leveled for agriculture. However, some native groups in upland areas had stabilized by 1872 (Bennyhoff 1977:89).

4.3.1.3 History

Historical Context

Historical use of the Delta region has centered around several major themes including early exploration, settlement, reclamation, industries, agriculture, transportation, and water management projects. Although recreation and wildlife habitat maintenance gained importance during the second half of the 20th century, they did not play a crucial role in the early history of the area.

Early Exploration

The first non-native intrusion into the Delta region occurred in 1775, when a Spanish explorer named Carnizares entered Suisun Bay. Although the difficulties associated with travel throughout the region led the Spanish to generally avoid the area, these same difficulties made the Delta region a haven for native peoples resisting Spanish Franciscan missionization. Under pressure from the missions with their associated military garrisons, tribal domains within the Delta apparently broke down rather rapidly. Cook (1955:56) states that "the delta area . . . was entered relatively early by the Spaniards and by the year 1820 had been almost completely swept of its native population". During the early 1800s and subsequent breakdown of the missions, the Delta once again became a refuge for "christianized" Native Americans. This period was short-lived, however, because settlement by Euro-Americans soon followed.

With hope of creating stability in the interior, and to build a buffer zone for the coastal areas, California's Mexican-appointed governors awarded land grants in the Delta region. Paso del Pescadero, which faced Old River in San Joaquin County, was granted in 1843. Other Mexican land grants extending into the area included Los Medanos in northern Contra Costa County, granted to Jose Noriega in 1835; Los Ulpinos in Solano County, granted to John Bidwell in 1844; and John Sutter's New Helvetia in present-day Sutter County granted in 1841 (Beck and Haase 1974, Hoover et al. 1990).

No permanent occupation is noted for the islands located in the Delta during this period and historical documents reveal that Euro-American settlement of the region did not begin to appear until after the Bear Flag Revolt of 1846. Following the acquisition of California by the United States and the nearly simultaneous discovery of gold in the Sierra Nevada, Euro-American settlement throughout the Delta and Suisun Marsh increased dramatically.

Settlement

Settlement in the Suisun Marsh area began with the establishment of Suisun City in 1850. Because of its topography, the settlement of the marsh varied for the remainder of the Delta. The major settlements would be clustered around the marsh's periphery. Vacaville was platted in 1851 and formally established in 1852 (Storey 1996). Establishment of the towns of Cordelia, Rio Vista, Fairfield, Rockville, and Vallejo soon followed. Although lands in the marsh were initially reclaimed for agricultural uses, intrusion of saltwater into the marsh resulted in the gradual abandonment of agriculture in the area. Today, although there is limited grazing, the marsh is largely undeveloped and the lands are devoted to duck clubs and the California Department of Fish and Game's Grizzly Island Wildlife Area (Storey 1996).

Settlement and land use patterns in the Contra Costa portion of the Delta were more diverse than those situated farther upriver. In addition to agricultural activities, growth of the region was supported by a brief flurry of coal-mining speculation on Rancho Los Medanos in the 1870s. Coal was discovered in the hills south of Antioch in 1855 by George Hawxhurst and William Israel (Theodoratus 1980). Their discovery prompted a series of mining towns to be established during the 1860s in the Mt. Diablo foothills south of Antioch (Theodoratus 1980:106).

Antioch was founded in 1850 by the Smith brothers, carpenters from New Hampshire (Hoover et al. 1990). By the turn of the century, Antioch had become a major shipping center for the Mt. Diablo coal industry, as well as an agricultural area (Theodoratus 1980:106).

In 1849, Jonathan D. Stevenson purchased Rancho Los Medanos and began to lay out the site for a city that he named "New York of the Pacific" after his home city. When the Mount Diablo coal mines began operations in the 1860s, Pittsburg Landing was the coal shipping point (Hoover et al. 1990). Because of the poor quality of the coal, the shipping industry was short-lived. The New York of the Pacific was later renamed Pittsburg and was not of real importance until the 20th century, when it became a major manufacturing center and military base (Hoover et al. 1990:62).

Farther upriver, the agricultural development spurred by reclamation was accompanied by a growth of towns along the major waterways. Many of the Delta towns prospered only briefly before disappearing. A few, such as Mokelumne City and Emmaton, were destroyed by floods. Many communities flourished, however, and continue to be inhabited today. The towns of Rio Vista, Hood, Isleton, Locke, Freeport, and Courtland represent settlements that were established as a result of the burgeoning agricultural industry. The town of Walnut Grove provides an excellent example of settlement in the Delta from agricultural use of reclaimed land.

The site of Walnut Grove was established around 1851 as a boat landing by John Wesley Sharpe. Sharpe remained at this landing, building a frame hotel and general store. His settlement was the first established in the Delta region.

By 1880, Walnut Grove had a "commodious wharf", hotel, general merchandise store with a post office and Wells Fargo express inside, blacksmith and wheelwright shops, butcher shop, and seven residences. Four steamers, traveling from San Francisco to Sacramento, stopped daily (Sacramento Bee, December 24, 1880:8). Although other towns were developing in the Delta (i.e., Rio Vista, Isleton, Courtland, Hood, and Freeport), Walnut Grove was the largest and most visited because of its location midway between San Francisco and Sacramento.

By the mid-1880s, entrepreneur Alexander Brown had raised the Walnut Grove hotel one story, constructed a large public hall, operated a general store, and was an agent for the Southern Pacific Company (Sacramento Union, June 25, 1886:3). Alexander Brown also raised crops, including barley; vegetables, beans; and, after 1890, asparagus, on nearly 4,000 acres of rented

land (Davis 1890). Brown established Walnut Grove as a center for shipping agricultural goods throughout the nation.

Walnut Grove also served as the center of social and economic life for many Chinese and Japanese seasonal agricultural workers in the rural Delta. The Chinatown was probably established by about 1870, but it is known to have been established by 1885. The first Japanese business, a *udan-ya* (noodle shop), opened in the town by 1896. By 1910, the Asian-American community included hotels; restaurants; and dry goods, drug, mercantile, and grocery stores (Ariki 1979:2).

Although the transient farm laborer population declined somewhat during the Depression era, the permanent Asian-American population of Walnut Grove prospered in the early 1930s. Other Asian-American communities flourished in Stockton, Isleton, Courtland, Locke, and Rio Vista and served as centers for the rural farm laborers.

Reclamation

Recognizing the richness of the upper peat soil deposits, American entrepreneurs saw the area as potential farmland. However, with the exception of the higher natural levees, the majority of the lands in the Delta were subject to periodic flooding that precluded settlement.

The passage of the Swamp and Overflow Land Act of 1850 transferred ownership of the Delta from the federal government to the State and opened up the land for speculation by developers (Thompson and West 1879). By 1871, nearly all of the State's swamp and overflow lands had been sold (Owens 1991:19). Under the Green Act of 1868, there were no limits on the amount of swampland available to individual purchasers and a few individuals secured title to as many as 100,000 acres or more in the Delta area (Owens 1991:19). By the 1870s, reclamation districts were established and attempts to reclaim the islands began.

During the late 1860s, Chinese laborers laid off from railroad construction provided the workforce necessary for a large-scale reclamation effort. Although many islands were reclaimed during the 1870s, the levees were built using unstable peat soil and often failed, resulting in floods and continual levee construction. With the exception of Bouldin Island, peat soil tracts and islands situated within the interior Delta region were not successfully reclaimed until after the invention of various dredging machines in the late 1800s.

The Tide Land Reclamation Company, one of the first to operate in the Delta, partially reclaimed Union Island (West 1996). The first levee enclosure of any size was made in 1872 at Union Island, but was washed out in spring 1876. Victoria and Woodward Islands were created when Union Island was divided. The canals outlining Victoria Island were cut before 1885 (West 1996). Work began on the North Victoria/Woodward Canal in mid-September 1876 by a labor force that included nearly 3,000 Chinese laborers. Seven to 8 miles of twin retaining walls were in-filled with dredge-pumped sand to create the levees for the canal. Portions of swamp varying in size from 10 to 1,000 acres were left on the natural channel side of Union Island to

avoid the cost and flood risks associated with building levees around meander bends. Subsequently, these swamps were removed and/or cut into islands with further channel modifications (West 1996).

Reclamation of the Pescadero properties began in 1877 with the construction of a 750-foot dam across the head of Paradise Cut, the second tributary of San Joaquin River as it enters the Delta. Some 400 workers constructed the 7-foot-high earth barrier and prepared 2,000 acres for cultivation near Old River. At about the same time, other crews completed the levees on the Pescadero portion of Union Island. (Thompson 1957.)

The Byron and Clifton Court tracts were reclaimed prior to 1900. Initial reclamation of the Byron Tract from 1870 to 1874 began with a 4.5-foot levee along Old River. Flooding in 1875 was followed by the enlargement of the levee to the south from 1877 to 1879, but the land was not fully reclaimed until about 1900. Clifton Court Tract was reclaimed in 1898 or 1899 (Thompson 1957). Both tracts flooded on March 22, 1907. Periodic dredging was conducted to restore and maintain the levee system of these tracts and reclaim the agricultural potential of the land.

An important aspect of reclamation was the ability to dry out the soil and keep it from saturating. During levee construction, sluiceways and gates were built to allow captive water to be released from the islands at low tide. This drainage system worked well during normal water flows, but broke down during flood periods when seepage onto the islands was accelerated. (Thompson 1957:275-276.)

Farmers in the Delta began experimenting with pumps as early as the 1870s, but were not successful until after 1900. The first pumps were powered by horses and were quickly replaced by steam-driven machines. Steam-powered centrifugal pumps were put into use near Walnut Grove by 1885 and soon began appearing on various islands around the Delta. Pumps became instrumental in draining land and were sometimes mounted on barges as levees were being constructed. Once complete, permanent pumping stations were installed on islands. By 1920, steam pumps had been completely replaced with electric units. Reclamation continued and included a system of bypasses designed to divert floodwaters around improved lands (Storey 1996). Over the last 80 years, all the levees have been modified and enlarged and none of the original levees remain intact.

Agriculture

In the early 1900s, the full potential of the Delta region as prime agricultural land was realized. Reclamation of the Delta islands greatly expanded the amount of land available for agriculture and accelerated the trend toward tenant farming.

Reclamation after 1900 required substantial resources of financial capital, consolidated ownership of large tracts of land, and engineering experience. Lee Phillips and George Shima played an important part in bringing these resources together.

Phillips, along with other Los Angeles investors, purchased 25,000 acres of tule land in the San Joaquin Delta in 1902 and continued to acquire land thereafter. This group formed different corporations over the next 5 years to reclaim one island at a time (Paterson et al. 1978:51). In 1912, Phillips formed California Delta Farms, Incorporated out of seven small single-island reclamation companies. In addition to the California Delta Farms properties, Phillips managed another 21,000 acres on Rindge, Upper and Lower Jones, and Palm Tracts (Paterson et al. 1978:21a, 22, 23).

Shima, a Japanese immigrant who leased farm land and grew potatoes in the Delta, bought and leased additional land in the region (Fujita 1980; Hata and Hata 1986:57). Shima and Phillips agreed that Shima would lease and farm land reclaimed by the California Delta Farms Company including Webb, Holland, Orwood, Empire, McDonald, Shima, Bishop, Cohn, and Henning Tracts and King, Medford, Mandeville, and Bacon islands (Maniery 1993). Phillips bought land, installed pumps, and built levees and Shima prepared the peat for farming, built labor camps, and farmed or rented to tenant farmers (Maniery 1996).

Farming during this period was conducted either by these large-scale operations or by tenant farmers who rented land. Although the first farm labor camps were located on levee grounds, by 1900, Delta farmers devised a series of camps to facilitate cultivation of vast fields. Farmers divided each tract of land into sections ranging from 100 to 500 acres. A labor camp was located in each section, often at the levee base. Each camp possessed its own housing, cooking facilities, sheds, horses, barn, and farm implements. Large warehouses for packing, storing and processing crops were usually located near the top of the levees close to landings or wharves (Paterson et al. 1978:42-43).

Many of the laborers and tenant farmers before World War II were Asian. After initial levee construction, Chinese provided the major workforce, remaining to prepare the land for cultivation and later as seasonal laborers. Other situations developed where a landowner would lease land to one Chinese person, who then brought his countrymen to farm (Chan 1986:208-209).

During the early 20th century, Japanese immigrants began to replace the Chinese as tenant farmers and laborers, largely as a result of anti-Chinese legislation restricting property ownership and immigration rights. Although this Japanese workforce was augmented at times by East Indians (1910s) and Filipinos (1920s), it remained the dominant labor force until the removal of Japanese from the area during World War II (Maniery and Costello 1986:38-45). During the war, the district was occupied by Filipino and Mexican laborers, who were brought in by the local farmers to take over the work in the orchards and fields (Kawamura 1987). Other labor groups included the Italians and Portuguese.

Also of note within the Delta region are George Hack and State Senator William Johnston. In addition to being State Senator, Johnston was a prominent farmer in the Delta region and his Rosebud Ranch, north of Hood, is listed on the National Register (Boghosian

1979). Hack was in the dairy business and his house, constructed in 1879, is a California Point of Historical Interest (Maniery 1993).

Today, as in the past, much of the land in the study area is owned by nonresident corporations, although a number of large family farms remain active. Leasing farm land is still common. One result of property consolidation has been the destruction of tenant farmsteads and labor camps. Abandoned structures were commonly burned and the land used for crops (West 1996).

Mechanization of farming has replaced the need for large numbers of laborers except during specialized short-term activities. The ethnicity of the work force has also changed through time. Today Mexicans and Mexican-Americans compose the largest ethnic labor group. The majority of the crops in the study area, such as asparagus, are of high value and a large percentage are shipped throughout the United States. Trucks, trains, and planes have replaced barges and boats for the shipment of agricultural goods. Landings and wharves, common during the historic era, have been abandoned for the most part and are marked by a few remaining piers.

Transportation

Transportation around the Suisun Marsh during the early 1800s was primarily by water, although the Pony Express route skirted the edge of the marsh in 1860 and 1861 (Storey 1996). In addition to sail and steamships that plied the waterways since the 1850s, small boats, barges, launches and schooners also provided access to the Delta. Several steamship companies called at large and small landings throughout the region. Improved landings consisted of piers and floating docks; others were merely clearings on a bank where vessels could secure lines to trees. Small piers or brush landings, consisting of masses of brush and tree pruning, continued to be used well into the 20th century (Waugh 1985:20).

Many landings were established to transport grains and produce grown on the islands to markets in San Francisco, Sacramento, and Stockton and were usually located at agricultural camps and canneries. Mohr's Landing was established north of Bethany (Hillman and Covello 1985). Webb Landing was established by 1885 and, by 1901, two additional landings were in operation near Webb (Punnett Brothers 1901). Days Landing, named after Sherman Day, was located in the northwest portion of Bacon Island along the Old River levee (Reid 1883). In 1894, two landings, Schultz and Central, were established in the southwest corner of Bouldin Island (Compton 1894), with an additional 14 being constructed by 1901 (Punnett Brothers 1901). Only seven of these landings were still in existence on Bouldin Island by 1912 (Quail 1912).

Gasoline launches, used throughout the region from about 1900 to 1920, provided service to the more out-of-the-way areas of the Delta (Storey 1996). Roads were typically constructed on levees or raised berms and remained primitive until truck and car traffic increased around 1910. By the 1920s, after increased development of ferries and bridges, trucks replaced water-based transportation. For the most part, the marsh region was excluded from this development (Storey 1996).

Several ferry crossings were present in the study area during the historic era. Benson's Ferry, California Historical Landmark 149, was purchased by John A. Benson in 1850. In 1852, Benson laid out the then-principal wagon road between Sacramento and Stockton (California Department of Parks and Recreation 1990). Ferry crossings to Clifton Court and north of Bethany are noted on the 1913 U.S. Geological Survey (USGS) map. Ferry service operated between Brannan Island and Rio Vista and between Grand Island and Brannan Island from 1882 to 1919 (Thompson 1981). By 1926 bridges replaced most ferry operations (Waugh 1985); however, ferries still operate at Woodward and Bradford Islands.

Between the turn of the century and World War I, an expansion of railroads throughout the Central Valley began to affect the pattern of Delta transportation (Owens 1991). The Southern Pacific Railroad Company organized the Sacramento Southern Railroad Company (SSRR) in 1903 (Maniery 1992). By 1905, SSRR began to purchase land between Sacramento and Walnut Grove on which to construct a railroad branch line to service the agricultural communities of the Delta (State of California 1980).

SSRR was planned to provide service from Sacramento to Stockton, with a branch line extending from Walnut Grove to Antioch (Maniery 1992). When the initial plans fell through to join the branch with the main line of either the Southern Pacific or Atchison, Topeka and Santa Fe, it became a branch line feeder of the Southern Pacific system instead (State of California 1980:19). Although other railroads in the region were elevated on certain sections of the levees, the Branch Line railroad was unique because the majority of its length was elevated (Maniery 1992). The elevated grade afforded protection against flooding, a major concern in the reclaimed areas of the Delta.

Although the railroad's primary objective was to transport agricultural produce from the Delta to Sacramento and points beyond, it also served as a vital link between the communities in the upper Delta region and distant markets (Maniery 1992:3). Although steamboats and gas-driven launches remained the mainstay of the Delta transportation system during the early 20th century, the railroads provided an alternative method for shipping produce, thus saving the local farmers both money and time. At least two of these railroads and/or branch lines have been determined eligible for the NRHP, the Walnut Grove Branch Line and the Sacramento Southern Rail Line.

Industries

Although agriculture formed the basis of the study area's economy since the 1850s, various industries were undertaken during the 20th century including canning, sugar refining, and brick making. These industries were attracted to the Delta region, in part, because of the deepwater river channel, which made transportation by major shipping lines viable.

One of the most important of these early industries was canning. The first cannery in the Delta region was established in Yolo County to pack salmon. Although no physical remains are left at this site, it is listed in NRHP as well as the California Inventory of Historical Resources.

Except for the aforementioned example, it was the asparagus boom that was largely responsible for initiation of the canning industry in the Delta. Both Bouldin and Andrus Islands had asparagus canneries in operation by the turn of the century, and over the subsequent years a number of canneries were established between Isleton and Locke.

By the mid-1930s, improved transportation routes and methods resulted in a shift of cannery operations to major urban centers. With this shift, the canneries had access to a greater variety of crops, permitting a longer packing season and a larger labor pool. Industrial canneries continued to relocate and, by 1940, most of the Delta canneries had ceased operations.

Interest in sugar refining was widespread in California in the 1870s and several pioneer companies attempted to establish refineries (Schulz and Farris 1994:109). A number of Andrus Island farmers joined together and formed the California Sugar Manufacturing Company, constructing a factory on the eastern edge of Isleton (Schulz and Farris 1994). Although the Isleton refinery operated for only a few short years, there were others in the region that did prove successful. One such firm, California and Hawaiian Sugar Company, later known as C & H Sugar, began refining at a plant in Crockett on March 6, 1906. This company continues to operate at the mouth of the Delta and now produces more refined sugar in 3 weeks than was turned out in its entire first year of operation.

The beginnings of brick manufacturing in the Delta region are unclear. As noted by Schulz and Farris (1994:52), brick manufacturing in the mid-1900s was often little more than a cottage industry. Temporary kilns, often set up only long enough to fire sufficient bricks for a building or two, could be quickly dismantled and may be the source for reports of brick construction at Mokelumne City and Walnut Grove (Schulz and Farris 1994). However, more permanent and productive brick factories were in operation in the Delta region by the 1880s.

Between 1878 and 1895, two factories operated in the upper Delta region, one at Freeport and one near Benson's Ferry. With kilns situated on the riverbanks and clay being obtained from nearby pits, common, ornamental and pressed bricks were produced and shipped to San Francisco from the Freeport plant. Output was 2,000,000 bricks in 1878, and 4,500,000 the following year (Schulz and Farris 1994:60). With slightly lower yearly outputs, the factory near Benson's Ferry was in operation by 1880. Apparently a fire ended brick making operations at this location in 1885; the Freeport plant lasted until 1895 (Schulz and Farris 1994).

Water Management Projects

Other major influences on the Delta included water management projects started in the 1930s, especially the Central Valley Project (CVP). The majority of these projects involved creating reservoirs to store irrigation and domestic water and resulted in reduced water flow through an area already altered by reclamation. These projects significantly altered the Delta and marsh environments. Wetlands management for waterfowl production and protection began in the 1920s and 1930s when hunting clubs began moving into the Suisun Marsh area. Today, other

hunting and wildlife protection organizations and the California Department of Fish and Game also maintain waterfowl lands.

Military Use

Military use of the upper reaches of the Delta has been limited, primarily focusing on the storage and transportation of supplies at Rough and Ready Island in Stockton. Between 1933 and 1940, the U.S. government dredged a deepwater channel along the north side of Rough and Ready Island during creation of the Port of Stockton. In 1944, owners sold most of the island to the U.S. Navy for development of Naval Supply Annex Stockton (NSAS) during World War II. The development of NSAS converted a portion of the island farmland into a military installation, complete with transportation and utilities infrastructure (Dames and Moore 1996:11). There were few changes to the installation between 1945 and 1960. In 1965, NSAS was decommissioned and a Naval Communication Station was established (Dames and Moore 1996:11).

World War II military bases were also located at Pittsburg and Antioch. Camp Stoneman, in Pittsburg served as a U. S. Army debarkation base while naval repairs were performed at the Antioch shipyards. Located immediately outside of the town of Concord, at the edge of the study area was the Concord Naval Weapons Station and Ammunition Dump (Mary Maniery, personal communication 1996).

4.3 Delta Region

4.3.2 Current Resource Conditions

4.3.2.1 Archeology

Prior to historic leveling for agriculture, many of the prehistoric sites in the Delta were low mounds, ranging in height from 6 inches to over 7 feet above the surrounding land surface (Schenck and Dawson 1929). Mounds are generally assumed to be natural rises that were enlarged by the gradual accumulation of midden, although there is some historical evidence that they may have been intentionally modified by the inhabitants (Belcher 1843:130). Some of the mounds extend below the current ground level and some are buried entirely, with no surface evidence. These later sites have been found exclusively during excavations unrelated to archeological investigations. Sites are generally located adjacent to watercourses. Late prehistoric sites are found along and upslope of the 1850 tidal influence line and on sandmounds within 10 feet of present day sea level. The composition of the cultural deposits varies greatly from black loam to yellow, silty clay. Intermediate deposits contain varying amounts of fine sand, generally yellow or tan, and may be representative of sublevels of mound deposits. Hardpans are common in sites in the higher elevation areas and in some sandmounds, most likely the result of long-term weathering. No prehistoric cultural deposits, other than isolates, have been reported in peat (>50% organics) or peaty mucks (25-50% organics).

In situ prehistoric remains contained within Delta deposits are restricted to the upper two-thirds of the Holocene (<6000 years). Unlike the San Francisco Bay, where sites extending from

3 feet to 18 feet below sea level have been found (Bickel 1978), no prehistoric Delta sites, with the exception of one questionable report (California Department of Transportation 1989), have been found to extend below contour elevations of -5 feet below mean sea level (msl) (based on U.S. Geological Survey 7.5-minute quadrangle map elevations).

Some Delta sites are reported to extend below present ground level and others are completely buried by alluvium. No attempt has been made to measure or date this alluviation, but the rate is undoubtedly highly variable and, as Schenck and Dawson (1929:330) point out, a single event may be accountable. The few radiocarbon dates available for cultural deposits indicate that all are <4500 years B.P. (Schulz 1981). These relatively late sites were easily recognized and, therefore, were noted by early researchers. Manifestations of earlier cultures, after thousands of years of weathering, burial, and erosion, may be far more subtle and not so readily evident as those from the later period sites. This does not preclude that earlier sites and sites with deposits significantly below sea level could be found, but it does indicate that the likelihood of finding such sites would be low. Such a finding would be important because it might clarify the role that sea level and subsidence has had in the development of the Delta during the Holocene and may reveal an unknown cultural pattern.

Recorded Prehistoric Sites and Relationship to Landforms

To assess cultural resource distribution in the study area, information was obtained from the State Office of Historic Preservation and the Information Centers at Sonoma State University, Sacramento State University, and Stanislaus State University. A delimited file containing locational and site attribute data was clipped to restrict geographic coverage to correspond to the study area. This data was downloaded into Reclamation's Geographical Information System (GIS) with Arc/Info 7.0.3 as the primary software. Programming was accomplished through ArcMacro Language.

Site locations were plotted on U.S.G.S. 7.5 minute quadrangle overlays using Universal Transverse Mercator coordinates and compared to hard copy locations obtained at the Information Centers to check for accuracy. For all records where locational errors were discovered they were corrected. Plots were made on soils/landform data and Atwater's 1850's line of tidal influence and Quaternary sand deposits. Site density was determined for each individual soil/landform unit. Further sorts were based upon site attributes.

A total of 192 archeological sites are recorded within the Delta Region. These sites are not evenly spread across the study area. Certain soils or landforms contain a relatively greater number of sites than do others. As an example, channel deposits, floodplains, and basins compose approximately 40% of the total acreage within the study area, but approximately 80% of the prehistoric sites are located within these landforms. In contrast, those landforms identified as mucks, organic soils, and collectively fans, basins, and terraces compose 25% of the study area landmass and contain less than 4% of the prehistoric sites (Table 1).

One landform deserves special mention. Peat and muds of tidal wetlands represent approximately 25% of the study area but contain 10% of prehistoric sites. It is generally believed that such peat lands were undesirable for prehistoric occupation (West 1994). Pleistocene fossil sand dunes and other sand mounds protrude through these peat soils and these microenvironmental localities served as the basis for habitation. Such areas served as one foundation for the well-known mounds found in the Sacramento-San Joaquin Valleys. With the exception of six Delta quadrangles, the current level of GIS data does not record the presence of these sand features. In quadrangles where the sand mounds have been mapped, the correlation with site location is unambiguous.

Landforms (Landform Code)	Area (x1000)	%	Prehistoric Site Codes								Total Sites	%	
			01	02	04	07	16	15	15,09	09			
Channel Deposits (11)	82.1	10.3	11					7	23	14	12	67	34.9
Mucks: Delta/Marsh (12)	62.0	7.8								2		2	1.0
Flood Plains (14)	59.1	7.4	4					5	3	8	8	28	14.6
Peat and Muds (15)	185.9	23.4	1					1	3	9	4	18	9.4
Organic Soils (16)	105.2	13.2	1					1	1		1	4	2.1
Basins & Basin Rims (22)	151.8	19.1	3	3				2	17	17	13	55	28.6
Interfan Basins (31)	8.2	1.0										0	0.0
Fans Basins Terraces(32)	36.9	4.6							1			1	0.5
Eolian Deposits (33)	14.6	1.8						1			1	2	1.0
Valley Fill (34)	38.3	4.8			1			2	1	2		6	3.1
Alluvial Fans (35)	9.2	1.1										0	0.0
Low Terraces (41)	25.5	3.2						2	1	1		4	2.1
Dissected Terraces (51)	4.4	0.5							1			1	0.5
Steep Uplands (62)	7.0	0.8					2		1			4	2.1
Mountain Slopes (63)	4.5	0.5										0	0.0
Total	794.7	---	21	3	1	2	21	52	53	39	192	---	---
Percentage of Site Types			10.9	1.5	0.5	1.0	10.9	27.1	27.6	20.3	---	---	---

Table 1. Distribution of prehistoric site types by landsform type in the Bay-Delta study area. Prehistoric site types: 01: Unknown; 02: Lithic Sactter; 04: BRM/Milling Feature; 07: Architectual Feature; 16: Other; 15: Habitation Debris; 15 and 09: Habitation Debris with Burials; 09: Burials.

Elevation is another important environmental variable that affects site location. Approximately 90% of the sites in the study area are located beneath an elevation of 15 feet msl. The majority of sites are positioned in a band between sea level and 10 feet. Relatively few sites are recorded with elevations higher than 25 feet.

Relatively little systematic inventory of the Delta has been accomplished despite large-scale impacts from widespread agricultural development. Recent inventory reports describe systematic methods where only a small percentage of the study area was examined; however, it is believed that the majority of habitation sites present in the Delta has been recorded. Prominent prehistoric mounds attracted the interest of early archeologists and many sites were documented. Approximately 80% of the known prehistoric sites were recorded prior to 1960.

Geographic Reconstruction

As noted, the geography of the Delta is quite different today than it was prior to 1850, before there was extensive dredging and building of levees for reclamation of farmland. In some cases, these activities placed prehistoric archeological sites beyond their proper environmental context. Based upon the reconstruction of the lands subject to tidal influence (Atwater 1982) and a landforms/soils map, it is possible to view more clearly late prehistoric archeological sites in their original environment. The data are compatible to those observed in the Cosumnes River area (Pierce 1988).

Reconstructed watercourses, areas presently and formerly subject to tidal influence, and other features of surface geology (Atwater 1982) were used as a basis for generating predictive models of prehistoric settlement patterns in the south-Delta region (West 1994). The reconstruction of environmental features in the south Delta suggests a relationship between specific natural features (e.g., streams, major water channels, margins of tidal wetlands); sediment type; and elevation and the presence of archeological sites. Further mapping of extinct watercourses can help to explain the location of other sites and can be used to define areas of sensitivity for archeological sites that may now be buried. Although the relationship between cultural chronology and site distribution has not been addressed in this study or the previous south-Delta study, such analysis is warranted in future studies. Finally, age-dating the sediments on which sites are found may be useful in predicting the location of same-period sites.

4.3.2.2 Native Peoples

No reservations or rancherias are located within the legal Delta. A review of the primary ethnographic literature for the Delta Region found no traditional properties or sacred sites. Information about the presence of traditional cultural properties was requested from the Native American Heritage Commission. This included 14 individuals from whom information on the Delta was also requested. No known information was provided on traditional cultural properties or sacred sites.

4.3.2.3 Historic Resources

Historic use of the Delta for over 150 years has left a wide variety of historical property types in the region. Perhaps the most obvious of these are the hundreds of houses, factories, and commercial buildings that are present within the project. Farms with associated barns, sheds, milkhouses, outhouses, and fences line the main rivers, particularly between Rio Vista and Sacramento; many date to the 19th century. Buildings from labor camps, such as boarding, cook- and bathhouses, barns, sheds, and offices, can be found on most islands, although only Bacon Island retains a full complement of labor camps. All towns within the area have historical commercial and residential districts, portions of which have been surveyed and documented.

Less visible are the scores of historical archaeological resources within the study area. In the late 19th and early 20th centuries, most Delta islands were ringed with labor camps. Work on a few islands has identified archaeological remnants of camps including structural foundations and buried trash deposits; only a few of the known camps have been formally recorded and assigned trinomials. Subsurface refuse deposits, tunnels, and other features have been uncovered in the back lots and streets of Sacramento and Walnut Grove and most likely exist in other towns as well. Remnants of houses, foundations, refuse deposits, military installations, and industrial activities (e.g., cannery foundations) are also represented by archaeological remains and occur ubiquitously across the landscape. The majority of these have not been formally recorded.

Archaeological resources are not limited to the land. Several shipwrecks have been documented archaeologically off the City of Sacramento waterfront, and numerous others are suspected to occur within the deepwater channels. Remnants of historical wharves and landings are visible in the sloughs and channels of the Delta. Other underwater resources could also exist.

The following discussion is based on data obtained from a limited number of historical sties. A comprehensive list of all historical resources located within the Delta region was not feasible because of incomplete data. Historical archaeological sites that were not entered into the state trinomial system were not considered. It is acknowledged that the historical resources described below are incomplete. The breakdown of historical resources that were considered for this study are listed by county in Table 2.

Alameda County

Historic resource themes found in Alameda County include architecture, agriculture, exploration/settlement, and economic/industrial. Recognized and/or documented historical listings within the project are few and include one historical archaeological site for the Delta region. This site, CA-ALA-455, contains at least one structure in addition to other features.

Contra Costa County

Historic resource themes found in Contra Costa County include architecture, agriculture, economic/industrial, exploration/settlement, government, and military. Two historical districts, Pittsburg and Black Diamond Historical Districts, in addition to 85 individual properties, have been either listed or determined eligible for NRHP. The individual properties include building, mines, landing sites, ranches, railroads, and one cemetery. There are two properties that have been listed as California Historical Landmarks, and a total of 18 historical archaeological sites that have been entered into the State trinomial system.

Sacramento County

Historic resource themes found in Sacramento County include architecture, agriculture, economic/industrial, exploration/settlement, and government. NRHP lists five historical districts containing over 231 structures in addition to six individual properties. There are three historical bridges and two railroad systems that have been determined eligible for NRHP as well. The California Point of Historical Interest lists two structures. A total of four historical archaeological sites have been entered into the State trinomial system, although others have been identified but not yet assigned numbers. Portions of the city of Sacramento have been surveyed for historical and architectural resources for inclusion in the Office of Historic Preservation's Survey of Surveys. It is probable that the current listing contains only a small portion of the actual number of historical resources located in Sacramento County.

San Joaquin County

Historic resource themes found in San Joaquin County include architecture, agriculture, economic/industrial, exploration/settlement, government, and military. NRHP lists one historical district, Bacon Island Rural Historical District, and a total of 29 individual properties within the communities of Tracy and Stockton, portions of which are within the study area. The California Historical Landmarks listing includes four resources within the Delta region and the California Point of Historical Interest lists one structure. A total of 35 historical resources have been included in the State trinomial system. Portions of the cities of Stockton and Tracy have been surveyed for historical and architectural resources for inclusion in the Office of Historic Preservation's Survey of Surveys. It is likely that the current listing contains only a small portion of the actual number of historical resources located in the Delta region.

Solano County

Historic resource themes found in Solano County include architecture, agriculture, economic/industrial, exploration/settlement, government, military, and social/education. NRHP lists one historical property and 18 historical archaeological sites that have been entered into the State trinomial system. The California Point of Historical Interest lists one

structure. In addition, the nearby communities of Cordelia, Rio Vista, and Suisun City contain 21 NRHP properties, primarily building, some of which may be in the study area.

Yolo County

Historic resource themes found in Yolo County include architecture, agriculture, economic/industrial, exploration/settlement, government, and social/education. NRHP lists 37 historical properties within the Delta region and one archaeological site is in the State trinomial system. Portions of the city of West Sacramento have been surveyed for historical architectural resources for inclusion in the Office of Historic Preservation's Survey of Surveys.

County	State Trinomial	NRHP District**	NRHP Individual Properties	California Historical Landmarks	California Inventory Historical Resources	California Points of Historical Interest
Alameda	1	-	-	-	-	-
Contra Costa	18	2	85	2	-	-
Sacramento	4	5	11	-	-	-
San Joaquin	35	1	29	4	2	1
Solano	18	-	1	-	-	1
Yolo	1	-	37	-	1	-
Total	77	8	163	6*	3*	4

Table 2. Summary of historical resources located in the Delta Region. Note: Numbers are based on available data and may not be all inclusive.

4.4 Bay Region

4.4.1 Historic Perspective

4.4.1.1 Archeology

The earliest known occupation of the San Francisco Bay area took place by approximately 8000 B.C., based on radiocarbon dates from a few locations in the south Bay Area. Several radiocarbon dates from sites throughout the Bay Area indicate that populations of hunter-gatherers were sparse by approximately 5000 B.C., with settlements in the hill country and along the bay and ocean shores. This Archaic Period is characterized, like the Sur Pattern identified in the Monterey area, by generalized hunting and gathering subsistence. Midden deposits with a wide variety of faunal remains, including shell, but shell mounds are not typical of this period.

By approximately 2500 B.C., the Berkeley Pattern appears in the east Bay Area (Contra Costa County). It has been hypothesized that the Berkeley Pattern "represents Utian (Miwok-Costanoan) cultural developments and geographic spread throughout the Bay and northern Central Coast regions. Old Berkeley Pattern components share many traits with those of the Windmill Pattern, suggesting a common origin" (Moratto, 1984). No evidence exists to support a claim of social or cultural replacement, and it has been concluded that there was continuous occupation of the area by Costanoan people (ethnographically known) for more than 2,000 years (Moratto, 1984).

4.4.1.2 Native Peoples

The Costanoans are a linguistically defined group composed of several autonomous tribelets speaking eight different, but related, languages. The Costanoan languages, together with Miwok, compose the Utian language family of the Penutian stock (Levy 1978a). The territory of the Costanoan people extended along the coast from San Francisco Bay in the north to just beyond Carmel

in the south and approximately 60 miles inland. This territory encompasses a lengthy coastline and several inland valleys (Breschini et al. 1983). The primary sources for ethnographic information about the Costanoans are the Culture Element Distribution lists compiled by Harrington (1942). Other sources include notes of explorers, missionaries, and seafarers who came in contact with the Costanoans (Levy 1978a).

The Costanoans were hunter-gatherers, relying heavily on acorns and coastal resources. However, a wide range of other foods was also exploited. These sources included various seeds (growth was promoted by controlled burning), buckeye, berries, roots, land and sea mammals, waterfowl, reptiles, and insects.

The Costanoans were politically organized according to tribelets, each tribelet having a designated territory. Marriages were polygamous, households were generally composed of patrilineally extended families, and clans and moieties were the basis for group identification.

In religion, prayers and offerings (e.g., to the Sun) were practiced, as were shamanism and witchcraft. Dreams were interpreted and used as guides for future activities (Levy 1978a). Tule balsas for watercraft, bows and arrows, cordage, sea otter blankets, and twined basketry were made (Levy 1978a), as was the usual range of lithic and bone tools.

In 1770, the time of the establishment of the first mission in Costanoan territory, the population numbered an estimated 10,000, but it declined to less than 2,000 by 1832 because of introduced disease and a decreased birth rate (Levy 1978a). Missionization of the Costanoans virtually destroyed these people's culture.

4.4.1.3 History

The San Francisco Bay Region is characterized by urban and suburban development since the mid-1800s. The area has been a major shipping, manufacturing, military, and commercial center for all of northern California since the 1860s. Historic/architectural resources are related to the settlement of the region and include economic/industrial facilities, residential properties, commercial establishments, military installations, and government facilities.

4.4 Bay Region

4.4.2 Current Resource Conditions

4.4.2.1 Archeology

Considerable industrial and residential development in this region has taken a toll on archeological resources. Prehistoric sites have been destroyed by urban development and by the spread of industrial construction. Archeological sites remain in areas that have not been fully developed. Sites can also be found capped under asphalt and below buildings.

4.4.2.2 Native Peoples

There are no formal reservations or rancherias present within the Bay Region. There are a number of Native Americans who live in the area. Mount Diablo is a well known land mark that holds mythic importance to the Costanoans (Kroeber 1925:472) as part of one of their creation myths.

4.4.2.3 Historic Resources

Numerous historic properties are recognized as historically significant under state and Federal programs. Table 3 lists both archeological and historical properties, as reported by the CVPIA Technical Appendix. While development along waterfront areas is intense, as illustrated by the table significant numbers of historic properties exist. There are active historic preservation programs, societies, and organizations active in the Bay Region.

County	Number of Properties in the National Register of Historic Places	Number of California Historic Landmarks	Number of Sites in California Inventory of Historic Resources	Number of California Points of Historical Interest
Alameda	113	33	221	36
Contra Costa	25	12	108	10
Marin	33	13	30	4
San Mateo	39	34	75	34
San Francisco	121	43	141	12
Santa Clara	76	41	149	60

Table 3. Number of formally recognized historic resources in the San Francisco Bay Region.

4.5 Sacramento River Region

4.5.1 Historical Perspective

4.5.1.1 Archeology

The northern high Sierra Nevada foothills appear to have been first used by Great Basin people around 6000 B.C. By approximately 2000 B.C., people possibly from the Great Basin were seasonally hunting and gathering in the higher elevations and apparently also extended well into the Sacramento Valley. Their material culture has been termed Martis, after the Martis Valley, where they were first recognized.

Four additional prehistoric phases or complexes comprise the archeological sequence for this area. Patterns of human occupation are based on settlement patterns, projectile point forms, stone vessel and mortar types, burial practices, and ornamental forms. The Mesilla Complex (approximately 1000 B.C. to A.D. 1), Bidwell Complex (A.D. 1 to 800), Sweetwater Complex (A.D. 800 to 1500) and finally the Oroville Complex (A.D. 1500 to 1833) represent the chronology for this area. The epidemic of 1833 marks the end of the Oroville Complex.

A tentative reconstruction of a prehistoric sequence has emerged for the west side of the northern Sacramento Valley. This sequence is marked by several cultural introductions that may have coincided with population movements into the region. Specifically, the earliest occupants of this portion of northern California are believed to have been Hokan speakers whose material culture closely resembled the assemblages of the Borax Lake and Mendocino complexes dating to a similar time period (ca 4500 B.C. to A.D. 200). Large, wide-stemmed projectile points, manos, and milling stones are frequently encountered artifactual types.

Some time by approximately A.D. 200, Penutian-speaking people entered the region and initially disrupted, and eventually displaced, the Hokan occupants in many areas. As the Penutian expansion progressed, considerable pressure was exerted on the neighboring Yana, who eventually withdrew a substantial distance from the eastern edge of the northern Sacramento Valley. The archeological expressions of this late prehistoric time period in Yana territory are represented in the Mill Creek and Dye Creek complexes (Dondero et al., 1982), which is contemporary with the Shasta Complex materials of the Redding area. Sundahl (1982) further distinguishes Teharna Pattern peoples (Yana Indians) from Augustine Pattern peoples (Shasta Complex, ancestors of the ethnographic and historic Wintu Indians).

4.5.1.2 Native Peoples

Seven Native American groups occupied the general area of the Sacramento River Region. These seven groups are divided into two language stocks. The Wintuan and Maiduan Linguistic Families are derived from the Penutian Language Stock. The Maidu, Konkow, and Nisenan speak variation of the Maiduan Family, whereas the Wintun, Nomlaki, and Patwin are separated into the Wintuan Family. The Yana, found in the north east portion of this region, speak a language derived from Hokan Stock (Shipely 1978).

The Maidu (also known as northeastern Maidu), Konkow (also known as northwestern Maidu), and Nisenan (also known as southern Maidu) inhabited an area of California from Lassen Peak to the Cosumnes River, and from the Sacramento River to Honey Lake. The division of these three groups is based on language differences and geographic location.

The subsistence strategy of the Maidu, Konkow, and the Nisenan was based on seasonally mobile hunting and gathering. Acorns, the primary staple, were gathered in the valley along with seeds, buckeye, salmon, insects, and a wide variety of other plants and animals. During warmer months, people moved to mountainous areas to hunt and collect food resources found in higher elevations, such as pine nuts. Because their territory was largely a mountainous one, these groups relied more heavily on hunting than did the other people.

Politically, the Maidu, Konkow, and the Nisenan were organized around the tribelet. Each tribelet was composed of several villages, and when needed for group decisions or group activities, the headman of one of the villages in a tribelet was selected to be the leader. Headmen were not powerful, but acted as advisors and, among the Maidu and Konkow, were chosen through the auspices of a shaman for qualities such as wealth, maturity, ability, and generosity. Among the Nisenan, the headman position was hereditary.

The histories of the Maidu closely parallel one another following Euro-American contact in 1808. After the first contact, extensive exposure to whites occurred between 1828 and 1836, with intensive fur trapping in the region by Hudson's Bay Company. In 1833, a malaria epidemic killed up to 75 percent of the Maidu population. Sutter's Fort, established in Nisenan territory in 1839, became the focal point of settlers and miners' incursions into Maidu and Konkow areas (especially after the 1848 discovery of gold). The population reduction from the epidemic left the Maidu, Konkow, and Nisenan unable to resist the overwhelming flood of miners and settlers. Many of the few survivors became wage laborers on mines and ranches, and their language and culture diminished.

The western side of the Sacramento River Region north of Suisun Bay was inhabited by Wintuan-speaking people. Linguistic analysis has divided these speakers into the Patwin (a southern group), Nomlaki (central group), and Wintu (northern group). The central and northern groups closely related to one another and are combined for this discussion.

Wintu and Nomlaki subsistence was based on three main staples: deer, acorns, and salmon. All three were abundant within the western Sacramento Valley, particularly along the Sacramento River and its primary tributaries. These staples were supplemented with an immense array of less abundant resources, some seasonally available and some procurable year-round.

The availability of salmon has been used as an important variable in assessing prehistoric population levels (Baumhoff 1963). The exploitation of salmon is considered a major determinant of site distribution within portions of the Redding area (Raven et al. 1984). Other important riverine resources included trout, lamprey, whitefish, suckers, mussels, and clams. Fish poisons were used in securing various aquatic resources (La Pena 1978), many of which were then dried and stored for winter use (Du Bois 1935).

Deer constituted a major dietary staple, a food source that was both abundant and available essentially year-round. Deer were often hunted individually with bow and arrow, but also communally by being driven into snares, into ambushades, or over cliffs (Du Bois 1935). Other animals that were hunted include bear, rabbit, quail and other birds, rodents, and certain reptiles (Goldschmidt 1978; Du Bois 1935).

Acorns constituted a food resource that was seasonally abundant as well as storable. Prepared during late prehistoric time periods with a hopper mortar and pestle into a meal for soup or a flour for bread, acorns were available for immediate consumption or for winter storage. Black and valley oak acorns were preferred for breads. Buckeye, which, like acorns, had to be leached, was an important vegetal resource, and other vegetal foods, including herbs, nuts, berries, fruits, seeds, and roots, were consumed in large quantities in early spring and summer (Goldschmidt 1978; Du Bois 1935).

Although the nuclear family was the basic, face-to-face interaction group of the Nomlaki and the Wintu, the social life of both groups was centered on the village, or tribelet, as originally described by Kroeber (1932b). Village authority was vested in a headman whose succession was inherited patrilineally, subject to approval by other male elders.

The Nomlaki and Wintu were greatly affected by the 1833 malaria epidemic and they never overcame the devastating effects of this epidemic. Following the arrival of miners and settlers, the Nomlaki and Wintu suffered further reductions in population. Eventually, survivors were moved to reservations and camps. By the 1930s, there were three Nomlaki rancherias of six households each, with the men serving primarily as casual or migratory laborers (Goldschmidt 1978).

The Patwin ranged from Suisun Bay north along the Sacramento River to beyond Sutter Buttes. Their western boundary was formed by the Pomo, Wappo and other groups. Tribelet settlements tended to be located on high ground, along the Sacramento River or along tributary streams. The ethnographically recorded villages of Aguasto and Suisun, were located near the marshy environment associated with San Pablo and Suisun bays.

Several of the major settlement areas, particularly those near the rich Sacramento River and San Francisco Bay resources contained as many as 1,000 or more persons (Powers 1976). However, temporary settlements and camps tended to vary considerably in size, depending primarily on the nature of the foraging or processing tasks being undertaken. Generally, the Patwin settlement system involved occupation of a number of habitat types and construction of a variety of residential structures, ranging from small camps containing only temporary brush shelters, to large, permanently occupied villages containing numerous more substantial circular pit houses.

Typically, a tribelet chief would reside in a major village where ceremonial events also were typically held. The status of such individuals was inherited patrilineally among the Patwin, although village elders had considerable power in determining who actually succeeded to particular positions. The chief's main responsibilities involved administration of ceremonial and economic activities. A Patwin chief had more authority than his counterparts among many of the other central California groups (McKern 1922; Kroeber 1925, 1932a; P. Johnson 1978).

Many items that could not be obtained locally were procured through an active and extensive trade network. Clamshell disk beads served as currency in the region, and the Patwin routinely imported pine nuts, seeds, bear hides, beads, and sinew-backed bows from the central Wintun and shell beads, magnesite, salt, clams, and obsidian from the Pomo. In exchange, they exported salmon, river otter pelts, cordage, shell beads, bird feather headbands, and sinew-backed bows to the Pomo (Davis 1974). In some instances, they acted as middlemen for particular items in the east-west or north-south movement of various commodities.

The growth of missions within California had significant long-term impacts on the Patwin. The southern Patwin provided several Spanish missions with neophytes. Once at the missions, introduced diseases, such as measles and smallpox, were instrumental in reducing the Indian population (Cook 1943; P. Johnson 1978; Bennyhoff 1977; McCarthy 1984). The onslaught of Euro-Americans during the late 1840s, coupled with the gold rush beginning in 1849, decided the fate of the Patwin culture. By 1871-1872, when Stephen Powers surveyed the state while gathering ethnographic information, the Patwin culture no longer existed.

The Yana were linguistically composed of four subdivisions: northern, central, southern Yana, and Yahi. The Yana language is classified within the Yana Family (Yana and Yahi are the only members) of the Hokan stock. The Yana were hunter-gatherers who relied heavily on the acorn crop, their primary food source. Other important food resources included deer, bear, antelope, elk, salmon, rabbits, quail, insects, rodents, river mussels, various roots, tubers, bulbs, seeds, buckeyes, pine nuts, and berries.

The principal political organization was that of the tribelet, a large village with several allied smaller villages. Each tribelet had a chief or headman who inherited his position. The chief's power was confined to prestige, advice, and suggestion. He did not have the power to impose his will on the other members of the tribelet.

Like most Native American groups in California, the Yana manufactured a wide range of implements from bone, antler, wood, and stone. Obsidian, the preferred material for projectile points, was an item of trade by groups to the north. Baskets were made, but they were apparently of relatively poor quality.

The first European contact of the Yana may have occurred as early as 1821, when a mission-military expedition entered their territory. Overall, mining and settlement had little effect on the Yana. However, in 1846, Captain Fremont attacked and killed several Yana. The ensuing years brought several massacres, which resulted in the nearly total elimination of the Yana-Yahi people. The story of Ishi who was brought to live at the University of California in 1911 is told by Theodora Kroeber (1961). Ishi, the last Yana, died in San Francisco in 1916.

4.5.1.3 History

Settlement of the Sacramento River Region is characterized by agricultural development on the valley floor and by mining in the Sierra Foothills. Agricultural activities are based on the establishment and development of commercial crops, accessibility to markets, new farming techniques, and irrigation. Agriculture has been important in the region since the late 1800s after failed miners searched for alternative income.

Mining activities in the region are related to the discovery of gold at Sutter's Mill along the South Fork of the American River. The discovery of gold near the Indian village of Koloma in 1848 led to a massive invasion of miners. Thousands of men raced to the American River. Initially armed with pans and picks, they later used powerful hydraulic hoses to search for gold. Major gold mining activity took place along various rivers flowing from the Sierra.

The economy of the Sacramento River Region has been based on mining, agriculture, and government services since the late 1800s. Historic resources are related to the settlement of the region and include mining features, homesteads, economic/industrial facilities, residential properties, commercial establishments, and government facilities.

4.5 Sacramento River Region

4.5.2 Current Resource Conditions

4.5.2.1 Archeology

The massive agricultural development of the valley floor has significantly damaged many archeological sites. Prehistoric mounds have been leveled, sites have been repeatedly disced and plowed in agricultural fields. As a result artifacts have been broken and features destroyed. Some intact archeological deposits may occur in buried contexts or beneath the plow zone.

Urban development has also destroyed many sites, particularly along the lower American River in the vicinity of Sacramento. Urban and industrial development either destroys or covers sites. Environmental laws established since the 1960s has provided for studies prior to development.

The foothill regions of the Sacramento River Region contain undeveloped areas where archeological and historic sites are found. Acorn processing sites are commonly found in the oak woodland. According to a site density model prepared for the American River Water Resources Investigation (West, Welch, and Hansen 1995), the foothills and granite-based upland areas contain a projected 3.5 and 2.8 sites per square mile. Habitation sites and bedrock mortar or other milling sites are the most common types found in these areas.

4.5.2.2 Native Peoples

There are 19 reservations or rancherias in the counties that comprise the Sacramento River Region. Some of these reservations may fall outside the boundaries of the study area. There are also an unknown number Public Domain allotments within the region.

Many natural or geologic features are traditionally considered sensitive or sacred. As examples of the sacred natural landscape, the Konkow and the Maidu considered Sutter Buttes special as the location from which spirits of the dead left for various places in the afterworld (Kroeber 1925: 439). Butte Mountain is the site of the first Hesi ceremony performed by ancestors of the Nisenan. The Nomlaki considered Lassen Butte as the home of a mythical figure (Curtin 1898). Marysville Buttes and Mount Shasta are places of mythical importance to the Patwin (Kroeber 1932) and Wintu, respectively. The Yana held locations as places of special cultural importance (Sapir 1910, Kroeber 1925).

4.5.2.3 Historic Resources

Many sites are recognized as historically significant under the various state and Federal programs. Table 4 provides a list of archeological and historic properties reported by the CVPIA Cultural Resource Technical Appendix for each county that comprises the Sacramento River Region.

County	Number of Properties in the National Register of Historic Places	Number of California Historic Landmarks	Number of Sites in California Inventory of Historic Resources	Number of California Points of Historical Interest
Amador	15	23	43	5
Butte	24	9	31	19
Colusa	5	3	6	3
El Dorado	16	29	40	8
Glenn	2	2	17	17
Napa	57	17	31	11
Nevada	19	18	46	35
Placer	13	20	27	18
Sacramento	69	56	43	16
Shasta	22	19	41	15
Solano	18	14	30	7
Sutter	0	2	22	21
Tehama	8	4	13	1
Yolo	18	2	37	8
Yuba	8	6	25	12

Table 4. Number of formally recognized historic properties in the Sacramento River Region. Note: Numbers include total sites for county. Some sites may be outside actual region.

4.6 San Joaquin River Region

4.6.1 Historical Perspective

4.6.1.1 Archeology

On the margins of Tulare Lake, fluted and stemmed spear points have been found on the same surface as the fossils of Pleistocene mammoths, horses, camels and bison. While undated, the fluted spear points

suggest, based on comparisons with similar points from datable contexts, an age of about 11,000 years ago. The stemmed points suggest that early hunters occupied the valley floor some 8,000 to 10,000 years ago.

Prehistoric occupation of the Sierra Nevada foothills east of the San Joaquin River Region dates back more than 9,600 years. The vast majority of discovered sites, however, are less than 500 years old, probably representing a relatively recent proliferation of settlements by Yokut Indians (Moratto 1984). The high Sierra Nevada mountain area is typified by seasonal camps characterized by lithic scatters and few bedrock mortars. The valley/foothill transition zone more often includes sites with midden deposits, structural remains, and numerous bedrock mortars.

The earliest known foothill archeological cultures have not been described in detail, but the presence of stemmed spear points and thin slab milling stones indicates a hunting and gathering subsistence pattern.

The next described component of the prehistoric sequence, called the Chowchilla Phase, dates from 800 B.C. to A.D. 550 and is characterized by fish spears, large projectile points, milling stones, various shell beads and ornaments, and atlatl darts. Extended and semi-extended burials with large quantities of grave goods are also associated with the Chowchilla Phase.

The Raymond Phase, (A.D. 300 to 1500) and the Madera Phase (A.D. 1500 and 1850) are distinguished by milling stones, core tools, projectile point types, and various shell ornaments. The later Madera Phase is noted for bedrock mortars and imported ceramics as well as cremations in addition to flexed burials.

The sequence for the western side of the lower San Joaquin River Region begins with the aforementioned Windmill Pattern. This pattern is primarily linked to the valley floor along the Consumnes River, although Moratto contends that "Windmill groups may have occupied the Sierra Nevada foothills during the summer" (1984:206).

The State of California excavated several sites prior to the Federal government filling the San Luis Reservoir (Olsen and Payen 1969, 1983; Pritchard 1970). This work produced separate chronological descriptions. The Positas Complex is an early, poorly defined complex tentatively ranging in age from 5,250 to 4,550 years ago (Moratto 1984), although Olsen and Payen reported two widely ranging radiocarbon dates of 645 ± 90 and $2,400 \pm 100$. This complex includes cylindrical pestles, milling slabs, mullers, "doughnut stones", and other chipped stone tools (Olsen and Payen 1969).

The Pacheco A Complex (approximately 3,550 to 1,650 years ago) represents the Middle Period. Olsen and Payen felt this complex represents "an incursion of coastal people to the west edge of the valley" (1969: 41) due, in part, to the presence of flexed burials at a time when extended burials are found in the Central Valley. Certain shell bead types, some rare stone beads, abalone ornaments, distinctive bone artifacts, and polished stone objects are linked to this complex. Other artifact forms include mortar and pestle, rectangular milling slabs, mullers and stemmed or side-notched projectile points (Olsen and Payen 1969).

Late prehistoric archeology was present in many of the sites excavated by Olsen and Payen. The Gonzaga Complex (1,650 to 950 years ago) is defined largely by materials removed from cemeteries. Burials from the San Luis area for this time period is predominately extended with some semi-flexed inhumations. Artifacts

include a variety of beads types, bone tools, ear plugs, large bowl mortars, slab milling stones, and mullers. Projectile points are rare.

The Panoche Complex (450 to 150 years ago) is the final late period cultural manifestation (Olsen and Payen 1969, 1983; Pritchard 1983; Peak and Weber 1978). This complex and holds relationships with the south as well as the Sacramento-San Joaquin Delta (Haversat and Breschini 1985). Characteristic artifacts include bead forms, small, side-notched, concave-based projectile points, and abundance of well-flaked scrapers, bone tools, ear spools, various ground stone forms, a crude brownware pottery, and bedrock mortars. The Gonzaga and Panoche Complexes fall within the same era as the Augustine Pattern.

4.6.1.2 Native Peoples

The Yokuts and Miwok peoples once found in the San Joaquin Valley Region are described in the Delta ethnographic section. One other group merits mention for this region. The Monache, or Western Mono, represent six separate, but linguistically affiliated groups.

The Monache are generally distinguished from the Foothill Yokuts by language and location, rather than by cultural traits. The Monache language is classified within the Numic family, or Uto-Aztecan stock, found in California only with the Monache and Eastern Mono. The primary sources of ethnographic information on the Monache are Gayton (1948) and Gifford (1932). These and other sources are summarized in Spier (1978a).

In general, the Monache lived on the west slopes of the Sierra Nevada, between 3,000 and 7,000 feet elevation. They ranged over a much wider area into the eastern slopes of the Sierra Nevada. Monache groups were seasonally mobile hunter-gatherers. Acorns, their dietary staple, were collected in large quantities and stored for the winter in elevated granaries in the villages. A wide range of other plant and animal resources were also used and are similar to those described for other groups. The North Fork Monache crossed to the east side of the Sierra Nevada to collect pinyon pine nuts and yucca roots. These were traded to the other Monache groups, as well as to Yokuts (Spier, 1978a). The Monache produced twined basketry (including cradles), steatite cooking vessels, and ceramic vessels (coil method, fired) besides the usual array of lithic and bone implements.

The Monache believed in supernatural totemic spirits that might be used by people with the right knowledge. One with such knowledge might become a shaman. Shamans were thought to have the power to cure or harm others.

4.6.1.3 History

The San Joaquin River Region is characterized by both agricultural settlement and mining. Agricultural activities encompass the entire floor of the valley. Agricultural development spread as failed miners sought other forms of income in the 1800s. Mining activities in the eastern portion or the portion of this region that lies in the Mother Lode are related to the gold rush of the mid-1800s and the subsequent commercial extraction of ore. The economy of the east side of the region has been based on mining, agriculture, and commercial services since the late 1800s. Historic resources are related to the settlement of the east side of

the region and include mining features, homesteads, economic/industrial facilities, residential properties, commercial establishments, and government facilities.

4.6 San Joaquin River Region

4.6.2 Current Resource Conditions

4.6.2.1 Archeology

This region is similar to the Sacramento River Region since vast agricultural development has destroyed many prehistoric sites. Remnants of prehistoric sites still occur in agricultural lands, but they have been highly disturbed. Many sites are found in relatively undisturbed areas along the San Joaquin River and its associated sloughs. Buried sites are possible in this area due to the high rate of sedimentation. Finding such resources is problematical.

4.6.2.2 Native Peoples

There are eight reservations or rancherias in the counties that comprise the San Joaquin River Region, although some of these reservations may fall outside the boundaries of the region. There are also an unknown number Public Domain allotments within the region. The Monache have several places of mythological importance. Table Mountain near Friant were visited by mythical beings (Gifford 1923).

4.6.2.3 Historic Resources

Many sites are recognized as historically significant under the various state and Federal programs. Table 5 provides a list of archeological and historic properties reported by the CVPIA Cultural Resource Technical Appendix for each county that comprises the Sacramento River Region.

County	Number of Properties in the National Register of Historic Places	Number of California Historic Landmarks	Number of Sites in California Inventory of Historic Resources	Number of California Points of Historical Interest
Calaveras	13	42	56	4
Fresno (eastern portion)	32	7	33	12
Fresno (western portion)	2	1	9	2
Madera	1	0	10	6
Mariposa	29	8	15	0
Merced	12	5	13	7
San Joaquin	31	23	28	8
Stanislaus	17	5	12	7
Tuolumne	19	20	79	4

Table 5. Number of formally recognized historic resources in the San Joaquin River Region.

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