VENTURA RIVER ESTUARY ENHANCEMENT

ENHANCEMENT AND MANAGEMENT ALTERNATIVES

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1.0 INTRODUCTION

The Ventura River Estuary Enhancement Project study area lies directly west of the City of San Buenaventura and approximately 60 miles west of Los Angeles. The study area covers approximately 110 acres and is comprised of two publicly owned parcels, the Emma Wood State Beach (California Department of State Parks) and the Seaside Wilderness Park (City of San Buenaventura) and one privately owned parcel, the Hubbard property (Figure 1).

A study of the existing conditions along with an analysis of site opportunities and constraints was completed and submitted in the first phase of the planning effort. This document outlines the enhancement and management alternatives that could be implemented at the Ventura River Estuary for the enhancement of biotic resources that are balanced with public access for recreational and educational benefits. A final restoration plan will be prepared following a review of these alternatives and a selection of options for inclusion in the final plan.

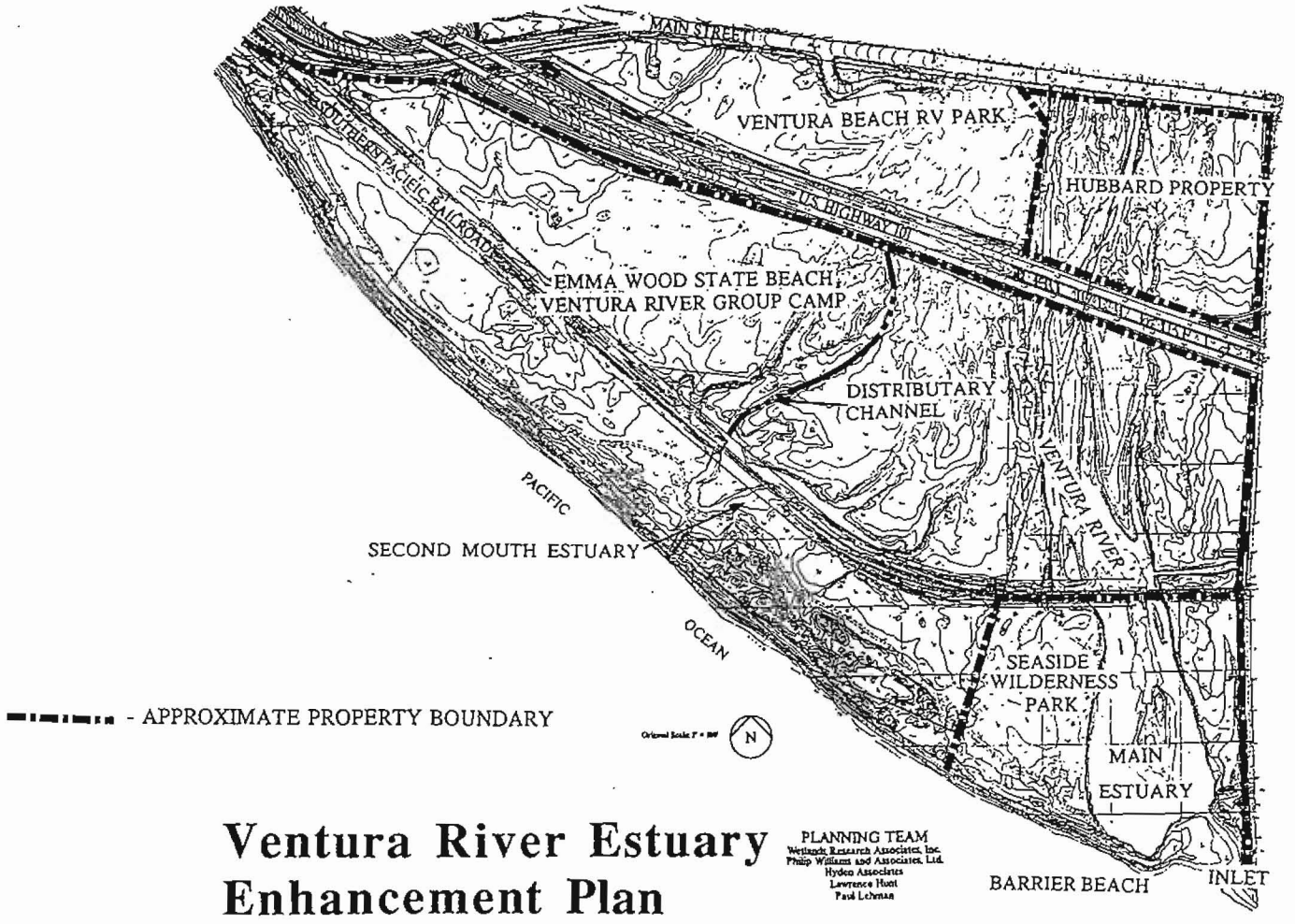
2.0 GOAL AND OBJECTIVES

The overall goal and site specific objectives for the enhancement plan were developed by the Project Management Committee with public input.

2.1 OVERALL ENHANCEMENT GOAL

The Project Management Committee approved an overall goal for the Ventura River Estuary Enhancement Project:

> *Develop an implementation plan that provides phased restoration and management of habitats within the lower Ventura River basin and allows public access and interpretation to be compatible with sensitive habitat areas. The plan will establish the basis for and guide site policy, financing, operational and management decisions.*



Ventura River Estuary Enhancement Plan

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Figure 1. Location map of the Ventura River Estuary Enhancement Project

Wetlands Research Associates, Inc.

2.2 ENHANCEMENT OBJECTIVES

The objectives for the Ventura River Estuary were established to implement the overall goal and include recommendations for the lagoon, the second mouth, wetlands, riparian, and dune areas that reflect the existing habitat characteristics of the site and its historic, current and projected physical conditions.

Objectives are as follows

- Anticipate the type of significant events that could dramatically change the area and define alternative flood control measures for levels of habitat restoration.

- Define and prioritize both eradication and re-establishment programs for biological resources in each habitat area. In addition to identifying species, specific minimum conditions and related management requirements should be outlined.

- Describe monitoring programs for each habitat area.

- Identify water quality parameters appropriate to meet the needs of habitat areas. This includes nutrient loading, freshwater input, river flow and other quantitative physical condition limits that can be tolerated by each habitat area. Possible management processes/techniques that could be employed to enhance the quality of water entering the estuary should be proposed.

- Define appropriate public access that is compatible with each habitat area, such as active and passive recreation or natural study. Trails, interpretive themes, and special focus areas should be delineated. Siting and a conceptual floor plan for a small interpretive facility should be included in the overall public access plan.

- Develop a phased implementation program and an interim operational/land management program for periods between phases.

As described in the report on existing conditions, physical constraints limit the ability to develop overall site alternatives. Rather, various areas within the project site have been identified that have habitat or recreational values that can be better managed and/or enhanced. The components of the enhancement plan can best be grouped into two main areas: habitat enhancement and management and public access and interpretation. Within these groupings, a series of possible actions are described and evaluated. A recommended alternative is then proposed. Secondary alternatives considered are also presented so that these options are considered based on cost and feasibility. A summary of the evaluation criteria used in considering various options is given in Table 1 (at the end of this report). The location of the proposed activity is indicated in Figures 2 and 3. In many cases, each alternative can be implemented independently depending upon fiscal resources and public needs. Where necessary to implement recommendations concurrently, it is indicated in the description.

3.0 HABITAT ENHANCEMENT AND MANAGEMENT

The Ventura River Estuary is a dynamic environment and subject to dramatic change as illustrated by the 1992 flood. Nevertheless, as described in the existing conditions report, it supports a diverse wildlife resource and can be enhanced to provide better wildlife habitat to critical species that are wholly dependent upon the unique characteristics of this site. Human activities have severely impacted the estuary through the filling of wetlands and riparian habitats, construction of roads and right-of-ways, trampling and destruction of vegetation, and planting or spread of non-native species. A purpose of the enhancement program is to preserve and expand existing habitat values, especially for species facing critically scarce habitat in the region.

3.1 SECOND MOUTH RESTORATION AND ENHANCEMENT

Habitat Description

The Second Mouth of the Ventura River (Figure 2, Area 1) is the terminus of active distributary channels that discharge flood waters during major floods. Prior to the 1970's, the Second Mouth supported a fresh/brackish water lagoon with associated wetlands and riparian habitat. Portions of the lagoon and wetlands were filled when the railroad was originally constructed in the late 1800's. Further filling occurred during construction of a pipeline project north of the railroad in 1969 and when one span of the double span railroad bridge was replaced with fill in 1970. Maintenance of the one remaining railroad bridge, the pipeline, and telecommunication lines (installed in late 1980's) results in re-occurring impacts to the remaining wetlands.

The Second Mouth consists of depressional areas north and south of the Southern Pacific Railroad. North of the railroad, the depression is broad and shallow and supports primarily coastal salt marsh plants dominated by pickleweed (*Salicornia virginica*) and salt grass (*Distichlis spicata*) with some cattail (*Typha* sp.) growing in slightly lower areas. The depression is partially surrounded by scrub/shrub wetland and riparian habitat. South of the railroad the

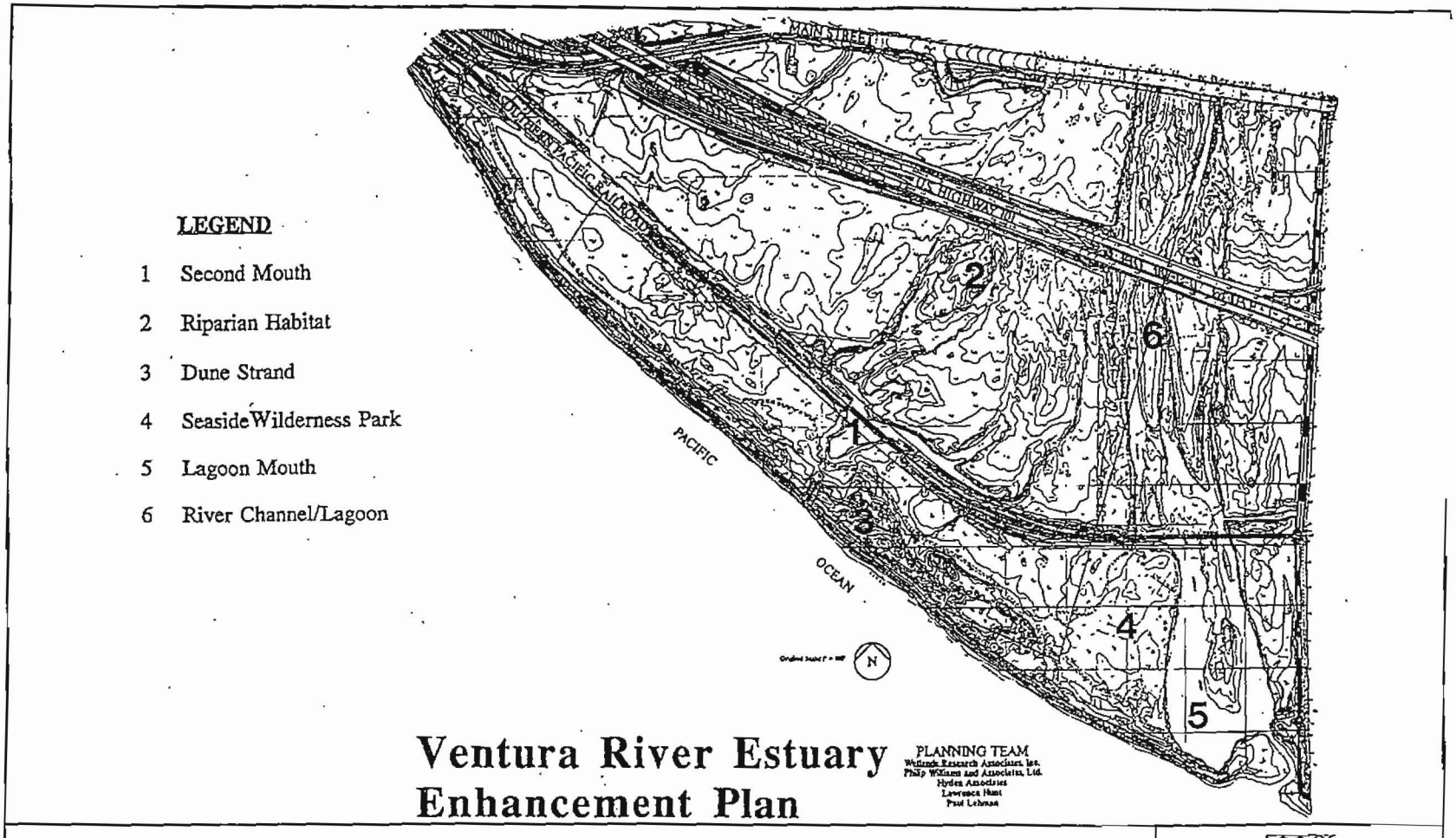


Figure 2. Location of enhancement and management areas of the Ventura River Enhancement Project.

Wetlands Research Associates, Inc.

depression is narrow and deeper and supports bulrush (*Scirpus maritimus*) with fringe areas of salt marsh vegetation. Scrub/shrub habitat extends to the east and west. Some of this vegetation was lost due to scouring during the 1992 flood. Portions of the Second Mouth scoured by the 1992 flood were immediately filled during emergency maintenance activities to protect the failing railroad bridge and buried communication lines.

The restoration of the Second Mouth represents an opportunity to provide a unique fresh/brackish seasonal lagoon habitat. Once a prevalent regional habitat, it is extremely rare today and there are few places to achieve significant restoration. Restoration would benefit an array of animals including water birds and mammals that would use the habitat for breeding, feeding, resting, and cover. Restoration of this habitat would be especially beneficial to amphibians whose habitat in the area is severely limited. Several plant species, such as cluster field sedge (*Carex praegracilis*) and Mexican rush (*Juncus mexicanus*), that are either extirpated or declining (Ferren et. al. 1990) in the area are restricted to this type of habitat.

Enhancement Options

The Second Mouth of the Ventura River is located at the confluence of distributary channels which drain the delta of the Ventura River during high magnitude floods. Effective restoration of the fresh to brackish water marsh relies on a design that will be maintained by major floods from the Ventura River. This approach is necessary because of the dynamic nature of the delta, where sediment scour and fill may rapidly change the dominant flow path during flood events. The benefit of developing a strategy that relies on "self-maintenance" is that flood flows would maintain the configuration of the Second Mouth and result in a design that is self sustaining. Alternatives requiring more complex engineering solutions could have larger capital cost, more expensive maintenance, and will fight against the dynamic natural processes in the area. Excavation in areas not naturally scoured would require structural support and rigorous maintenance to achieve stability in such a dynamic area.

Enhancement of a relatively stable self-maintaining fresh to brackish water marsh in the Second Mouth of the Ventura River is possible under the Southern Pacific Railroad Bridge. As flood flows are directed under the railroad bridge, scour occurs, removing artificial fill or sediment that accumulates during drier periods. This scour at the Second Mouth during floods has the potential to create a temporary tidal connection to the ocean and a brackish or freshwater marsh after sediment transport in the littoral zone closes off the mouth and the small lagoon is recharged by groundwater flow or when sea water is added to the lagoon during overtopping by storm waves (Ferren et al. 1990).

Options for the revegetation and enhancement of the Second Mouth include:

1. **Repair/replace existing span with a clear span design** - Plans to replace the existing bridge, which is unstable, are presently being considered by Southern Pacific Railroad. The flood flow efficiency will be increased with a clear span design by allowing passage of floating debris during floods; however, the bridge would still focus flood flows that would remove sediment that accumulates during drier periods. The lagoon that is formed during floods might also have a temporary tidal connection to the ocean. A brackish or freshwater marsh fed by groundwater would form after natural closure of the mouth. The benefit would be development of a self maintaining system and enhanced habitat value. The cost of restoration would be borne primarily by the Southern Pacific Railroad as part of the bridge replacement cost. The biological disadvantage is that full restoration of the Second Mouth to its historic condition would not occur as the historic width of the wetland would not be recreated beneath the single span bridge. The constriction will also result in a greater degree of scour (and hence greater removal of vegetation) than may have occurred when the double span was present.

2. **Replace existing railroad bridge with two clear spans as once existed on the site** - Replacing the existing railroad bridge with twin clear spans would create a wider opening that duplicates the historic condition. A wider bridge would allow greater flood flow capacity and allow for some flood scour at the Second Mouth during high magnitude floods. The proposed bridge design needs to convey high velocity flood flows without need for post-flood bridge maintenance (e.g., fill or rip-rap support). The benefit of this condition is the creation of a "self-maintaining system" with the same benefits as described above except that the degree of flood scour will be less and damage to vegetation in the restored area will be less. In addition, a larger area for restoration (due to wider bridge

opening) allows for a full restoration more similar to the historic condition with the habitat area north and south of the railroad being continuous. Cost would be high, but might be appropriately borne primarily by the Southern Pacific Railroad as mitigation for past filling. A disadvantage is the disturbance that will occur to existing habitat during construction.

3. **Excavate and enlarge fresh/brackish water lagoon and wetlands** - An enlarged fresh/brackish water marsh could be restored north and south of the railroad in conjunction with railroad bridge replacement. Restoration of an approximate 2 acre lagoon and vegetated marsh would require removal of fill and sediment deposits (up to 5 feet) to intersect the water table which fluctuates between approximately +1.7 feet (Wetlands Research Associates 1992) and +3.5 feet (Hawkes and Associates 1970). Following excavation, natural deposition/scouring to maintain (or change) the shape of the lagoon. Dynamic forces that create and maintain the area may alter the configuration during major floods. Benefits of the restoration would include immediate expansion of wildlife habitat (especially for native amphibians), enhanced aesthetic/public use value, increased flood flow capacity, and reduced maintenance and management costs. Additional pickleweed habitat could potentially be created to attract Belding's savannah sparrow, a California listed endangered and Federal Category 2 Candidate species. Initial construction cost would be moderate compared to the bridge replacement options. The primary biological disadvantage of this alternative is the short term impact to habitat during construction. In addition, future flood flows have the potential to scour portions of the lagoon and fill newly excavated areas.

4. **Restore additional habitat by excavation** - Enlargement of the Second Mouth habitat could be accomplished by excavation of sediment in an area to the north of the railroad bridge. No bridge replacement is proposed under this option. Excavation to approximately -2.0 to -1.0 feet NGVD would create an open water lagoon deep enough to prevent the growth of emergent vegetation. A sloping shallower fringe could be excavated to an elevation of approximately 1.0 to 2.0 feet NGVD to provide a vegetated buffer between the deep water and the floodplain. The benefit would be increased restoration of habitat even if the bridge replacement does not occur. The costs would be primarily associated with excavation. This alternative is not recommended because the dynamic nature of the Second Mouth Area would necessitate development of a costly and rigorous maintenance schedule. Maintenance requirements associated with this alternative would be high after flood flows which deposit sediment in the newly excavated portion of the Second Mouth or erode vegetation.

5. **Re-vegetate restored lagoon/wetland with native plants** - Installation of native

plants using salvaged or collected specimens, container stock, and/or seed would promote rapid vegetative establishment of the existing lagoon. The benefits of plant installation includes creating a diverse plant community of desirable plants (vs. a few dominant exotic species), rapid establishment of wildlife habitat, and aesthetic value. Plant installation costs would be low. A disadvantage is that dominant geomorphic processes (e.g., scouring) that create and maintain the area may alter the marsh configuration and rip-out vegetation during the next major flood. This option is only recommended as part of a bridge replacement option.

6. **Allow natural plant colonization** - Natural colonization is dependant on introduction of plant propagules into the area and establishment of young plants. The benefits of natural colonization are that plants will become established in areas suitable to their survival, eventual improvement of wildlife habitat, and aesthetic value. Cost would be negligible. The disadvantages are the potential establishment of a few early arrivals, native or exotic, would create a less diverse habitat of a few dominant species and complete revegetation of the site may require several growing seasons.

7. **Construct flood berm** - A flood berm constructed adjacent to the Ventura River would divert some flood flows from the sensitive habitat in the Second Mouth Area. This option is not recommended because evaluation of the natural processes in the Second Mouth area show that the habitat is created by flood flows and is dependent on flood flows for self-maintenance. In addition, the Flood Berm Alternative is not recommended because observation during the February 1992 flood illustrated that flood flows are directed into the Second Mouth area from sources other than overflow from adjacent the Ventura River including the "Fair Weather Crossing," a low spot on Highway 101, and through a Highway underpass near the entrance to Emma Wood State Park. Because flood flows originate from sources other than over-topping of the floodplain, a flood berm would not be effective.

8. **No Action** - It is likely that future high magnitude floods will scour an area similar to that scoured during the February 1992 flood. Although new habitat would be created by scour during future floods, a biological benefit, this option is not recommended because future floods are likely to destabilize the existing railroad trestle requiring fill or rock rip-rap to be placed in the Second Mouth. The Second Mouth lagoon would be disrupted by these remedial measures. Bridge replacement would obviate the need for fill in the Second Mouth. Costs would be low due to no excavation. The disadvantage is that no restoration or enhancement would occur and the site would be subject to continued degradation by temporary repairs to the bridge structure.

9. **Reroute the existing pipeline** - Pacific Pipeline Systems, Inc. is proposing to transport heated (140° F) crude oil through an existing, un-insulated 22 inch pipeline running along the north side of the railroad. The pipeline is buried at approximately -5.0 feet (NGVD) at the Second Mouth (Mobil Engineering Department 1970). Failure of the pipeline (e.g., metal fatigue, earthquake, flood damage) could cause severe environmental damage to sensitive habitat areas. The pipeline should be rerouted around the Second Mouth area. This would remove the area from immediate impact should a potential oil spill occur. It would also eliminate the need to disturb habitat at the Second Mouth if maintenance is needed. The cost would be borne primarily by Pacific Pipeline Systems, Inc. The disadvantage is the short-term disturbance to the project site.

10. **Upgrade existing pipeline** - Thermal effects (heat given off by the pipeline) may have negative impacts on overlying habitats. The existing pipeline could be insulated to minimize heat exchange. The benefit would be reduced thermal impacts to habitat. The cost would be low borne primarily by Pacific Pipeline Systems, Inc. Disadvantages include impacts to existing habitat during construction and maintenance.

11. **Reroute telecommunications lines** - Telecommunication lines are buried approximately 4 to 6-feet deep north of the railroad at the Second Mouth (Patrick Richardson, per. comm.). These lines face potential damage during floods. However, burial of the lines is considered temporary and are to be routed across the new railroad bridge when it is constructed. The benefit of rerouting is reduced disturbance from maintenance to habitat (habitat damage was noted following 1992 flood maintenance activities). Cost would be borne primarily by telecommunication companies involved. No disadvantages were identified.

12. **Provide public access to restored area** - Access would be limited to a view into the enhanced habitat provided from a viewing area off the Riparian Trail (See Section 4.3). No paths or trails along the restored lagoon and wetlands is proposed in order to reduce impacts to wildlife using the habitat. The viewing area would give recreational and educational benefits. Cost would be low. A disadvantage is that the viewing area may be subjected to damage during floods.

Recommended Alternative

The Recommended Alternative proposes to provide maximum habitat enhancement given the value of this habitat to sensitive species and its regional scarcity.

A double, clear span railroad bridge is recommended as the best means to achieve project objectives and restore the historic condition at the Second Mouth. The double span is required to maximize flood flow capacity through the area, to enable restoration of a self-maintaining, fresh/brackish water lagoon and wetland habitat, and increase wildlife use. Increased flood flow capacity may potentially reduce backwater flooding in adjacent areas, such as the Ventura River Group Camp. Initial excavation of the lagoon (a portion has already been scoured by the 1992 flood) followed by native plant installation will restore open water and vegetated wildlife habitat. Costs of excavated fill and sediment disposal can potentially be reduced by using the excavated soil for fill beneath the proposed Interpretive Center and/or construction of the wheelchair accessible ramp to the Riparian Trail lookout (See Section 4.4). A double span will also provide a wider view into the restored habitat and, possibly, the ocean beyond from the interpretive view area off the Riparian Trail providing greater aesthetic values for the public. Upgrading the existing pipeline by adding insulation should be done concurrently with lagoon excavation. Rerouting of communication lines across the railroad bridge is already contemplated and should be implemented. Actual construction costs for bridge, pipeline, and communication line work would be paid for by those corporate companies involved. Mitigation for this work may include portions of habitat enhancement at the Second Mouth, such as excavation, native plant installation, or completion of an enhancement monitoring program. Public access will be provided as viewing area into the enhanced habitat. Recreational and educational activities at the viewing area will include bird watching and interpretive displays featuring biological and geological themes. Monitoring would include determining the success of plant establishment, wildlife use, and condition of the "self-maintenance" system.

Secondary Alternative

A Secondary Alternative proposes to increase habitat value at minimal cost with balanced public access.

The existing railroad bridge should be replaced with a single clear span. Necessary repairs to the pipeline should be made and insulation added (if significant thermal impacts are expected). Communication lines should be rerouted across the bridge as proposed. Following these construction activities, restoration of a lagoon by natural scouring should be permitted. Excavation would be allowed if material is required for fill elsewhere in the project area, such as for the Interpretive Center site or for the wheelchair access ramp to the Riparian Lookout. Revegetation of the site would be by natural establishment of native species (with some control on exotics). Monitoring would include observation of "self-maintenance" system, control of exotic plant species, and monitoring of wildlife use.

3.2 RIPARIAN ENHANCEMENT/RESTORATION

Habitat Description

Riparian scrub and woodland found on the site (Figure 2, No. 2) is important wildlife habitat (see Existing Conditions report). It is found primarily on the western bank and flood plain of the Ventura River within the Emma Wood State Beach/Ventura River Group Camp and on the Hubbard property. Characteristic plants include broad-leaved deciduous and evergreen woody species such as mule fat, arroyo willow, sand bar willow, coyote brush, and upland shrubs such as California sagebrush and hoary ceanothus. Deciduous woodland species such as white alder, red willow, arroyo willow, black cottonwood, and California walnut are found on floodplain soils adjacent to the permanently flooded river channel.

The river delta mouth is an outstanding habitat for resident and migratory birds as evidenced by the bird observations recorded for this study. A number of unique reptiles and mammals also use this area. Based on historical photographs, the density of riparian vegetation in the project site appears to have increased due to stabilization of the channel. However, the extent of riparian habitat in the adjacent river floodplain has decreased due to conversion to agricultural and urban uses. Therefore, maintenance and preservation of this habitat type is critical.

Riparian habitat could be enhanced and expanded on the western floodplain. Protection and enhancement of the estuary and riparian woodlands in the study area and adjacent properties is critically important to the continued, albeit infrequent, establishment of territories and breeding of obligate riparian and shorebird species which are regionally declining. Removal of exotic vegetation and replacement with California native plants would improve the quality of habitat for wildlife. Areas of historic riparian vegetation that were removed by agriculture and other development could be replaced. Restricted human use would also increase habitat value because many of the species using riparian areas are sensitive to disturbance.

Enhancement options

Riparian habitat enhancement could include one or more of the following:

1. **Remove all non-native plants and re-vegetate with native species** - Non-native plants, such as giant reed (*Arundo donax*), castor bean (*Ricinus communis*), German ivy (*Senecio mikanoised*), and kikuyu grass (*Pennisetum clandestimum*) have colonized the riparian area due to introduction of propagules (seeds, live roots, etc.) produced on site and from upstream areas, disturbance from foot traffic, and past use of the site for agriculture. Non-native plants could be replaced with natives, such as willow (*Salix* spp.) or salt grass (*Distichlis spicata*). Plant community diversity could also be increased with plants once found in the area, such as Plummer's baccharis (*Baccharis plummerae*), bird's beak (*Cordylantus rigidus* ssp. *rigidus*), Jone's cryptantha (*Cryptantha muricata* var. *jonesii*), and Herman's tarweed (*Holocarpha hermannii*) (Ferren et al 1990).

   Replacing non-native plants with natives will improve wildlife habitat by providing food, nesting sites, and shelter to which native wildlife have adapted. California native plants, chosen for the habitat value they would provide are listed in Table 2. Removal of most invasive, less beneficial plants, such as giant reed or castor bean, should be conducted first. Use of motorized equipment, such as loaders or back-hoes, could be used on large areas of non-native plants. Heavy equipment should only be used where damage to surrounding habitat will be minimal. Subsequent manual removal of less invasive or re-colonizing non-native plants could occur as a continuing program. Successful establishment of native replacement plants will require proper installation and a maintenance program.

   The benefit of non-native removal and native replacement is increased habitat value for locally declining birds, such as tree swallow, warbling vireo, yellow-

breasted chat, and regionally declining migrants such as the yellow warbler. The costs, including non-native removal, replanting, and maintenance during establishment, would be moderate. A maintenance program consisting of irrigation, protective herbivore screen repair and subsequent removal (as plants grow), weed control, and other maintenance will typically last up to three years depending on the plant type (e.g., large trees require longer establishment period). A temporary drip irrigation system will reduce watering and weed control costs. The disadvantage is temporary disturbance and displacement of wildlife during non-native plant removal. Removal of non-natives should be followed with immediate replacement by native plants of similar habit (Table 2). Removal and replacement could be done on a phased basis with initial efforts focusd on the portion of the riparian area immediately adjacent to the river (see #3 below).

2. **Remove invasive non-native plants only** - Some non-native plants, such as giant reed and castor bean, are especially invasive and offer limited habitat value. These types of plants could be targeted for removal and replaced with suitable native plants. Removal of invasive plants may be conducted on a phased basis. Use of motorized equipment, such as loaders or back-hoes, could be used in first phase removal of large areas of non-native plants, such as giant reed. Heavy equipment should only be used where damage to surrounding habitat will be minimal. Subsequent phases of non-native plant removal, such as small colonies or individual plants, should be by manual methods as much as practicable. These methods are less damaging to surrounding habitat than removal by heavy equipment or use of herbicides.

   The benefit is the removal of only those plants that are especially damaging to wildlife habitat, replacement of plants that will improve habitat, and reduced cost. The disadvantage is temporary disturbance and displacement of wildlife in the existing habitat areas.

3. **Expand riparian woodland on western floodplain** - Riparian area could be expanded west of the existing riparian border into ruderal areas of the Ventura River Group camp. A maintenance program during plant establishment would require similar techniques described above (1). The benefit is expanded wildlife habitat and restoration of riparian areas. Cost would be moderate depending upon the extent of revegetation. No disadvantages were identified.

4. **Create a single interpretive trail and close informal trails** - The proposed Riparian Trail would be a graded, hard surface, wheelchair accessible all-weather path that generally follows the existing trail. It would extend from the Interpretive Center parking lot area eastward to the Ventura River, along the

western shore of the river, and back to the Interpretive Center passing by the Second Mouth. It would feature a lookout (also wheelchair accessible) for views of the river, the ocean, and adjacent riparian areas. Existing informal trails would be closed to prevent access using post and cable barriers and revegetating trails with native plants. Interpretive displays along the trail would provide education on biological, geological, and historical themes. Further details of the trail are given in Section 4.2. Benefits include improved public access as well as protection of wildlife habitat from human intrusion and destruction. Costs would be moderate. The disadvantage is initial disturbance to existing habitat during construction.

5. **Control pets, trap and remove feral animals (cats) present on site** - Domestic pets running unattended and feral animals, especially cats, pose a threat to wildlife including small mammals and birds that use the riparian habitat. Pets could be controlled on leashes and feral animals removed by trapping. The benefit would be improved habitat value for wildlife, including special status species such as least Bell's vireo (State/Federal endangered), yellow warbler and yellow breasted chat (both California species of special concern) and warbling vireo and tree swallow (locally/regionally declining).

6. **Provide security patrols to control habitat disturbance and destruction** - Human presence on secondary trails in the riparian area is destructive to vegetation, creates corridors for non-native predators, and fragments the existing habitat. Regular patrols by law enforcement would augment warning signs to reduce use of secondary trails. The intensity of patrolling would be high initially, but would decrease as the current pattern of use lapses. The benefit is improved wildlife habitat. Cost over time would be moderate. Requesting additional time from law enforcement with already limited resources is a disadvantage.

7. **Provide educational programs, site facilities, or alternate site for floodplain inhabitants** - Floodplain inhabitants, whether knowingly or unknowingly, cause disturbance to wildlife and destroy vegetation (for trails and living space areas). However, expectations to totally remove floodplain inhabitants from the area are unrealistic. To mitigate impacts to the sensitive habitat several options have been identified, including (1) developing an educational program about the sensitivity of the habitat; (2) place dumpsters and portable toilets at the Main Street parking lot to reduce waste and trash in the river; (3) encourage inhabitants to camp at an alternate, off-site location; (4) dedicate a portion of existing State Park campground area for use. Detailed descriptions and analysis of these options are given in Section 4.11. Benefits include reduced human disturbance and destruction in riparian/floodplain areas that would increase wildlife value and lessening chance for human injury/death during major floods.

Recommended Alternative

The Recommended Alternative proposes to maximize riparian habitat value and allow an acceptable level of public access.

Habitat value of the riparian areas can be improved by enhancing the quality and density of the vegetation and reducing disturbance from pets and feral animals and humans. Removal of non-native plants and replacing them with natives, expanding riparian vegetation on the west bank floodplain, and revegetating closed, informal trails will increase habitat value by improving vegetation quality (food source, roosting, cover, and nesting) and density that will attract a greater number and variety of wildlife. Revegetation of informal trailheads along the main trail should be a first phase effort to control public access. In the second phase, non-native plant removal and replacement would be conducted leaving informal trails open (beyond main trail barriers only) for movement of revegetation personnel, materials, and equipment. Revegetation of informal trails and expansion of western floodplain woodlands would be the third phase. Minimizing disturbance through creating and maintaining a single public use trail and closing informal trails, enacting leash laws, and removing feral animals, will further increase habitat value and encourage wildlife attracted to the area to stay on site. This will be a direct improvement of the environment for wildlife in general and for several special status species listed above (Option 5). It also enhances the interpretive experience of persons using park trails who will have a better chance to see wildlife. Construction of the Riparian Trail and closure of secondary trails must be done concurrently. Establishment of a viewing area off the trail at the Second Mouth depends on completion of the Second Mouth restoration. Monitoring of replaced vegetation establishment will determine if the planting program is successful. Additional monitoring of wildlife use will determine if revegetation and reduced disturbance in the habitat are meeting habitat enhancement objectives.

Since removal of the homeless and other floodplain inhabitants from riparian areas is not feasible due to limited law enforcement resources, the homeless should be offered the

opportunity to reduce their impact on riparian habitat. Through education, location of refuse receptacles and toilets, and an alternate off-site camping area, the impacts from habitat destruction and disturbance may be reduced. Monitoring the homeless population and their use of facilities will indicate the degree of this program's success.

Secondary Alternative

In the Secondary Alternative, only highly invasive non-native plants will be removed and replaced with beneficial natives. The Riparian Trail would not be a hard surface trail (and, therefore, not considered wheelchair accessible or all weather). Secondary trails would be closed using vegetation and post and cable barriers. The level of enforcement would be based on personnel availability. Reduced impacts from homeless and floodplain inhabitants would be by educational programs and placement of trash receptacles and toilets. Monitoring wildlife use will determine the level of habitat improvement success and will indicate if stronger methods are required to obtain the desired level.

3.3 DUNE STRAND RESTORATION

Habitat Description

Dune strand in the study area (Figure 2, No. 3) is found landward from the ocean beach along the Emma Wood State Beach and Seaside Wilderness Park. Dune strand includes both southern coastal dune and dune swale wetland habitats.

The study area's beaches are composed of sandy and cobble created, in part, by alluvial deposits from the Ventura River. Littoral drift also transports sand from up-coast sources eastward along the beach to down-coast beaches. Comparisons of historic and recent maps indicate the shoreline is moving landward. This landward migration of the beach is thought to be a regional problem caused by reduction of alluvial materials deposited by rivers on up-coast ocean beaches. The landward migration of the beach also results in loss of coastal dune and dune swale habitat.

The beach provides habitat for shorebirds that feed on sand dwelling invertebrates. With the loss of sandy beaches at Emma Wood State Beach (e.g., converted naturally to cobble stone or artificially to rip-rap or concrete seawall), shorebird feeding habitat is being lost (along with public beach access). In addition, nesting and roosting habitat for California least tern (*Sterna antillarnum browni*) and western snowy plover (*Charadrius alexandrinus nivosus*) will become restricted to the immediate river mouth. Habitat for the California legless lizard (California species of special concern) is also being lost.

Coastal dunes, occurring between wave-swept ocean beaches and back dune swales, have declined in the project area and throughout Southern California. Causes for decline include urban expansion, coastal development, and human disturbance. Foot traffic and off-road vehicle traffic destroy dune vegetation causing de-stabilization and drift. Past attempts to stabilize dunes using non-native plants such as hottentot fig (*Carpobrotus edulis*) and common iceplant (*Gasoul crystallanium*), have resulted in displacement of native vegetation and wildlife. Where native dune vegetation, such as evening primrose (*Camissonia cheiranthifolia* ssp. *suffruticosa*) and beach-bur (*Ambrosia chamissonis*), can gain a tenuous hold on the sand, it can provide habitat for small mammals and reptiles. Special status species present or once present in the study area, such as least tern, western snowy plover, and the California legless lizard, commonly utilize coastal dunes and prefer native vegetation.

The dune swale wetlands provide habitat for numerous small mammals that rely on a relatively continuous cover of vegetation for protection from predators. Restoration of "holes" in the vegetation matrix created by trails and other impacts through controlled public access and planting with California native plants can greatly improve this habitat.

Enhancement Options

1. **Enhance coastal dune strand vegetation** - Existing dune and swale habitat could be enhanced by replacing invasive non-native plants with native species. Table 2 lists California non-native plants that should be removed and replacement native

plants that can be used to re-vegetate and stabilize dunes. The list contains some extirpated plants, such as bush lupine (*Lupinus arboreous*) and California sea rocket (*Cakile edentula* var. *californica*), that could be re-established. Removal of invasive species and establishment of natives should be completed in sections to avoid excessive dune de-stabilization. A temporary irrigation and maintenance program will be necessary to optimize establishment success. The benefit will be increased habitat value for wildlife, especially the silvery legless lizard (California Species of Special Concern) that is either scarce or has been extirpated from the site, the California least tern (State Endangered/Federal Endangered) which is known to roost and feed in the area and perhaps would nest, the western snowy plover (California species of special concern/Federal Category 2 Candidate Species) that is known to roost and perhaps would nest on the site, and the white-faced ibis (California species of special concern/Federal Category 2 Candidate) that was once seen on the site.

2. **Expansion of dune habitat** - Landward dune expansion may be accomplished by removing constraints to natural expansion, such as secondary trails, unnecessary roadways, and removal of non-native vegetation (especially in Seaside Wilderness Park). Expansion may also include supplementing or redistributing beach sand to fill gaps between existing dunes. Benefits will be increased dune habitat area that will better suit species of special concern (listed above) and provide additional protection and stabilization to surrounding habitats. Costs would be low. A disadvantage is temporary disturbance of existing habitat in some areas during revegetation efforts.

3. **Coastal protection using structural protection techniques** - Erosion of the Emma Wood State Beach is perceptible in a series of historical photographs. Erosion probably results from a reduction of sand entering the littoral cell from coastal rivers and streams. Beach erosion can be reduced by constructing engineered structures, such as rock revetments, groins, jetties, and sea walls. While these structures have been shown to be effective in reducing beach erosion under certain circumstances (Armstrong 1991), the effectiveness of such structures can only be evaluated following detailed engineering analysis. The potential benefit of such structures would be reduced beach erosion and protection of southern coastal dune habitat. The costs of design and construction of structures would be high. This option is not recommended for various reasons including high costs, potential loss of surfing area or potential hazard to surfers, and potential impacts (loss of sand) to down current areas, and in the case of revetments, such as concrete or rip-rap sea walls, may tend to reflect incoming wave energy and cause erosion of the beach.

4. **Coastal protection using beach nourishment techniques** - Beach nourishment programs are usually major projects that can enhance beach protection and recreation (Armstrong 1991). Surplus sand, perhaps dredged spoils from the Ventura Marina, could be placed on the beach to counter erosion. Benefits include increased protection of beaches and dune strand habitats and enhanced public recreation. Costs for beach nourishment are generally high, but depend on the hauling or pumping distance, the width of beach, and frequency of re-nourishment. This option is not recommended because beach nourishment has a short life span in many areas and offers only a temporary solution unless periodic re-nourishment planned. An additional disadvantage is the potential impacts (loss of sand) to down current areas. Further investigation of the feasibility of beach nourishment is warranted in order to develop a long-range plan for coastal protection in the project area.

5. **Beach access from Ventura River Group Campground** - Beach access from the Ventura River Group Campground should be controlled using a boardwalk or other guided path extending from approximately the pedestrian railroad undercrossing to the beach. Boardwalks and designated paths offer a well defined surface for pedestrians to follow, keeping them off adjacent vegetated areas. Careful routing of the boardwalk trail through existing sensitive habitat areas will further reduce habitat impact. Additional detail of this public access feature is given in 4.5. The benefit is reduced impacts to dune strand habitat. Cost would be moderate. A disadvantage is potential damage to boardwalk during major floods.

   Access on the beach foreshore and backshore would be allowed along the entire Emma Wood State Beach. Access to dune areas from the beach would be prohibited. East of the Emma Wood State Beach/Seaside Wilderness Park boundary, beach access would only be allowed on the beach foreshore as a crossing to beaches east of the Ventura River mouth. This access restriction is to protect sensitive least tern and western snowy plover habitat in the river mouth sand bar and western river bank area. Access limits would be designated using signs.

6. **Create dune strand trail** - The dune strand habitat covers a large area, however, uncontrolled access has caused impacts to dune habitat due to trampling of vegetation and other uses. Dune plants, once uprooted, are not easily re-established. Access could be controlled by designating a dune trail for public use and prohibiting off-trail access. Directional and informational signs, cable and post barriers along especially sensitive areas, or a boardwalk would inform and guide pedestrians and reduce impacts to dune habitat. This trail would connect to the Seaside Wilderness Park Trail. Portions of the trail through dune swale

wetlands may be inundated during wet times of the year. Additional detail of this public access feature is given in Section 4.6. The benefit is reduced impacts to dune strand habitat. Costs would be low. Disadvantages include potential impacts to dune habitat due to visitors leaving the designated trail and portions of the trail may be inundated during wet periods making the path impassable. This may cause visitors to develop unauthorized alternate paths around inundated areas. A raised path is not recommended in this habitat as sand and debris would collect adjacent to the path.

Due to potential nesting habits of the least tern and western snowy plover during the period April through September, certain areas may require special warning signs indicating people should keep away.

7. **Provide docent-led excursions** - The dune strand areas of the site have an established history of public use. Therefore, total restriction of the public from the area is not feasible. Organized docent led tours could be used to provide supervised access into the sensitive dune areas. Docent tours could be made a year-round activity, limited to heavy use periods such as weekends, holidays, or summers, or limited to particular times of the year, for example, to avoid least tern and western snowy plover nesting (April through September). This would require establishing a pool of trained, volunteer docents. Additional detail of this public access feature is given in Section 4.6. The benefit would be protection of sensitive dune habitat. The cost would be low. Disadvantage is reduced flexibility in public access.

8. **Prohibit public access** - Maximum protection of the dune strand area could result from prohibition of public access. Due to an established public use of the area and successful public use programs in other areas of California, this option is regarded as infeasible.

Recommended Alternative

Enhancement and protection of dune strand habitat is dependant on establishment and protection of native dune vegetation from the beach backshore to the dune swale area. Removal of non-native plants and replacement with natives that are adapted to southern coastal dune strand conditions will provide enhanced habitat protection and expansion and increased habitat value for several special status wildlife species. Furthermore, habitat protection using vegetation is preferred over structural modifications or re-nourishment practices to control beach erosion

that involve significant design, construction, and maintenance costs, reduce coastal aesthetic value, and may impact down coast areas by interrupting sand redistribution in the littoral cell. Additional protection from human disturbance is required that would be accomplished by designating a public use interpretive trail and prohibiting off-trail use. Clearly marked paths with post and cable barriers and interpretive displays can direct people though the area without harming vegetation. The trail would connect to the Seaside Wilderness Trail and the beach providing access into other areas of interest. Phasing of the revegetation program will include first revegetating existing open areas, such as informal trails, so non-native plants do not become established, followed by removal of existing non-natives and replacement. Non-natives should be removed in small sections to prevent destablization of dunes. Adjacent sections should not be disturbed until native establishment has been established in prior sections. Monitoring will be important to assure plant establishment is successful. Additional monitoring of public access and wildlife use should be conducted to determine success of control measures and habitat improvement.

Secondary Alternative

In this alternative the Dune Trail would be established with interpretive signs and post and cable barriers. Visitors would be prohibited from entering sensitive dune areas. Decreased disturbance in dune areas would allow existing vegetation to colonize disturbed areas naturally. Plant establishment should be monitored to determine revegetation success.

3.4 RESTORATION OF SEASIDE WILDERNESS PARK

Habitat Description

The Seaside Wilderness Park (Figure 2, No. 4) includes portions of the lower Ventura River Estuary and vegetated areas along the western river bank between the Southern Pacific Railroad and the Pacific Ocean. Since the river mouth/lagoon is treated separately in this report, this portion of deals directly with the area along the western river bank.

Historically, the Seaside Wilderness Park consisted of southern coastal dune and coastal scrub habitat (Ferren et. al. 1990). Efforts to create a public park began around 1913. Monterey pine, eucalyptus, and date palm were planted. These efforts were abandoned in the 1930's. Since then, the park has been reverting slowly to coastal dune and shrub habitat and many of the Monterey cypress are dying. Continued disturbance has probably contributed to the present ruderal nature of the area by indirectly encouraging non-native plants and discouraging colonization and establishment of native plants.

Enhancement Options

1. **Non-native plant replacement** - Non-native plants in this area could be removed and replaced with native plants. Several habitat types, including southern coastal dune, dune scrub, and dune swale, would be involved in this plant replacement effort. Removal of existing trees (some which are California natives, such as Monterey cypress, but were artificially planted) is not required, but should be removed if they become a hazard. Table 2 lists California non-native plants that could be removed and replacement native plants that can be used to re-vegetate this area. Benefits of this would be enhanced wildlife habitat (especially in California least tern and western snowy plover dune and beach areas) and returning the area to more natural conditions for a greater public interpretive experience.

2. **Seaside Wilderness Park Trail** - Public access could be provided to this area with a trail featuring a compacted earth path and interpretive monuments. The trail could connect to the Dune Trail at the western edge of the site and to the Riparian Trail across the railroad tracks to the north. The southern coastal dunes and backshore beach, the western bank, and the river mouth sand bar of the Seaside Wilderness Park are valuable California least tern and western snowy plover feeding, roosting, and nesting (potentially) habitat. Therefore, the trail should be routed away from these areas maximizing the habitat potential. A leash law should be enforced. Additional detail of this public use feature is given in Section 4.7. The benefit is continued but controlled public access, restoration of native vegetation, and reduced impact to sensitive wildlife habitat. The cost would be moderate. The disadvantage is some limitation of public access in an area traditionally used.

3. **Prohibit public access to the site** - To offer the most habitat protection to this area, especially California least tern and western snowy plover use areas, no public access would be allowed. Given the historical use of the site by the public

and with controlled access available, this is not a feasible option. The benefit, however, would be maximum habitat enhancement. The disadvantage would be loss of public access.

4. **Beach access across the river mouth sand bar** - Access to beaches of the Seaside Wilderness Park and Emma Wood State Park from the eastern river bank is across the river mouth sandbar. Pedestrians cross the sand bar during closed estuary conditions and others (surfers) wade across when the mouth is open. The most sensitive California least tern and western snowy plover roosting (and potentially nesting) habitat in the study area is on the river mouth sand bar extending from the beach backshore northward over the sand bar toward the lagoon. Beach foreshore areas are not sensitive habitat and could be used for public access. To protect California least tern and western snowy plover habitat the river mouth sand bar would be closed permanently to public access from the top of the beach foreshore across the top of the sand bar to the lagoon. Access between the beach foreshore and the surf would be allowed. Informational displays at the bike trail kiosk (Section 4.9) would inform the public about sensitive areas and signs posted on the sand bar would indicate public access limits. Dogs would be required to be on leashes to prevent them from roaming into sensitive habitat areas. Access along the beach would only be available under closed conditions or at low tide under open conditions. The benefits are enhanced California least tern and western snowy plover habitat and continued public access to beaches between the east and west. Costs would be low. The disadvantage is that access would not be available during high tide under open estuary conditions or for periods following major floods when the channel has been scoured.

Recommended alternative

The Seaside Wilderness Park is gradually reverting to natural habitat as the planted vegetation is dying. Replacement of non-native plants with natives will expedite natural processes and enhance wildlife habitat value. Vegetation replacement and establishment would first be conducted in the southern coastal dunes habitat to increase habitat value for least tern and western snowy plover. Subsequent planting would occur northward into scrub/shrub habitat. A public access trail passing through this area will have interpretive displays, will provide views of the lower Ventura River Estuary and ocean, and will link trails from two different habitats: dune strand and riparian. The trail is located away from California least tern

and western snowy plover habitat to maximize habitat value. A narrow corridor between the beach foreshore and the surf would allow public access between beaches east and west of the Seaside Wilderness Park. This will reduce (but not eliminate) disturbance to sensitive least tern and snowy plover habitat. Monitoring of planted areas will determine revegetation success. Special monitoring of public access and wildlife use on the river mouth sand bar and west bank will determine if control programs designed to enhance least tern and western snowy plover habitat are successful. Stronger control measures, such as further restricted access, may be implemented if results indicate excessive disturbance.

Secondary Alternative

Through controlled public access on a designated trail through the Seaside Wilderness Park, natural plant colonization due to less disturbance will be the primary means of revegetation. Public access across the river mouth sand bar between the beach foreshore and surf would be allowed. Monitoring results would determine if continued use of this access corridor is having adverse effects and then controls would be instituted.

3.5 LOWER ESTUARY

Habitat Description

Improvement of the lagoon habitat (Figure 2, No. 5) is largely dependant on the water quality. Water quality depends on the relationship between whether the river mouth sand bar is open or closed, the amount of fresh water flow, and the quality of fresh water flow.

Under existing conditions, the Ventura River Estuary provides important primary and nursery habitat for fish and foraging and roosting habitat for birds. Anadromous and catadromous fish use the river and estuary to access freshwater and saltwater habitats at appropriate times during their life-history cycles, including the tidewater goby (*Eucyclogobius*

newberryi), a California species of special concern and Federal category 2 candidate species. Various water and shore birds use the estuary, including several regionally declining and special status species such as the California least tern (*Sterna antillarum*), a California State and Federal endangered species, and the western snowy plover (*Charadrius alexandrinus*), a California species of special concern and Federal category 2 candidate species.

The Ventura River mouth sand bar opens and closes on an irregular basis. The presumed natural breaching and closure of the Ventura River mouth is based on knowledge of the Ventura River's streamflow and wave energy relationship as documented in the existing conditions report (WRA et. al. 1992). Upstream impoundments and diversions have reduced the historical frequency and/or duration of open and closed conditions caused by flood events and perennial flow. Under existing conditions, the Ventura River mouth is primarily a closed lagoon that opens sporadically when the river mouth sand bar is breached, such as during storm events or when sufficient flow fills the lagoon and tops the sand bar. The frequency, period of time, and season in which the estuary is open or closed is variable.

A significant portion (approximately 2 million gallons/day) of river flow during summer is effluent discharge from the Ojai Valley Wastewater Treatment Facility (OVWTF). Fresh water flow in the river and lagoon is important to maintain riparian vegetation and to decrease salinity in the lagoon for fish, such as the tidewater goby and juvenile fish, that are adapted to fresh/brackish water salinities.

Significant nutrient (and pollutant) loading is present in the river flow. Treated effluent from the OVWTF is discharged to the river year-round. Nutrient loading of river water at and below the OVWTF point of discharge has been documented (Montgomery 1991) with additional amounts of nutrient (and pollutant) loading from various storm drains (approximately 13) along the river (undocumented). High nutrient concentrations in river water and the estuary below the Main Street bridge were measured in 1991 (WRA et. al. 1992). Nutrient loading reduces water

quality due to eutrophication and increased biological oxygen demand.

During the winter, water quality is of less concern. Significant fresh water flows from the watershed following winter rains. High flows dilute nutrient concentrations from the OVWTF discharge and storm drains and keep the estuary open to daily tidal flushing. During open conditions fresh/brackish water fish, such as the tidewater goby and juvenile fish, move to the area where fresh water and salt water mix.

During the summer, water quality becomes increasingly important. With reduced flows the river mouth sand bar closes and the lagoon fills with brackish/fresh water. Fish adapted to these conditions spread throughout the lagoon. This provides foraging for fish eating birds, such as the least tern. However, fresh water flow with high nutrient concentrations eventually leads to eutrophication and algal blooms with subsequent algal die-offs and reduced dissolved oxygen (DO) levels. If DO level falls below levels tolerated by fish, fish kills will occur.

To increase water quality in the lagoon, fresh water flow during the summer must be maintained. However, nutrient loading in the river and lagoon must be reduced. Several options for reducing nutrient loading are discussed below.

Enhancement Options

1. **Decrease nutrient discharge from the OVWTF** - Nutrient input from the sanitary facility has been documented in past studies (Montgomery 1991). Nutrient reduction from the facility could be accomplished by using the reclaimed water for irrigation and providing releases from upstream impoundments to maintain present stream flow. The benefit is improved water quality while river flows are maintained. Costs would be moderate depending on the ability to charge for reclaimed water and subsequent use of these funds to maintain streamflow. The disadvantages are that some nutrient loading is still occurring and potential problems in negotiating and securing upstream freshwater releases.

2. **Decrease nutrient discharge using off-channel wetland retention basin** - An off-channel wetland would receive water from the sanitation facility, filter it

through emergent vegetation, removing nutrients in the process, and returning water to the river channel. A similar system has been proposed for the Malibu Lagoon and Tapia water treatment facility. Loss of water due to evapotranspiration would need to be replaced by upstream impoundment releases or decreased diversion to maintain flow in the river. The benefit is improved water quality with maintained river flows. The disadvantages are high costs associated with acquiring land for the retention basin and retention basin maintenance and potential problems in negotiating and securing upstream freshwater releases.

The quantity to be discharged needs to be evaluated in terms of the sensitive species within the lagoon. This should be done in context of setting water quality standards for the lagoon under the recently released water quality standards program.

3. **Dilution of nutrients through planned sand bar breaches** - The effects of excess nutrients in the lower estuary may be reduced by mechanically breaching the sand bar closing the lagoon mouth during periods of time when the lagoon would normally be closed. This could flush nutrients from the lagoon and increase the salinity of lagoon water by allowing tidal circulation. During periods when the lagoon mouth is closed, mechanical breaching of the sand bar at the entrance of the lagoon could be accomplished by heavy equipment such as a bull dozer or loader. The entrance of the lagoon has a high proportion of cobbles which are not easily transported by tidal currents or low energy waves. The cobbles in the bar and the lack of sand in the littoral cell is thought to be one of the main reasons why the lagoon did not close during the monitoring period. The presence of cobbles within the sand bar would probably control the depth of scour of the inlet during artificial breaching. It may be possible to breach the lagoon to partially drain the water.

This alternative relies on an adaptive approach toward management of the estuary. It is important to monitor nutrient levels and habitat values in the lagoon to determine the success of artificial breaching in improving habitat values, and to define the criteria for breaching based on biologic needs. The benefit would be improved water quality. The costs would be low. The disadvantages are increased management of the estuary including monitoring of nutrient levels and mechanical breaching when necessary and potential detrimental effects to the ecology of the estuary due to periodic artificial breaching (artificial breaching which flushes the entire lagoon had detrimental ecological impacts at the San Lorenzo River near Santa Cruz and at Malibu Lagoon), and public safety concerns. Public safety issues must be considered both during artificial breaching and when the lagoon breaches naturally since the seaward current during full or

partial flushing may be strong enough to carry a person into the ocean.

4. **Improve water quality in the watershed and from point and non-point pollution sources** - Increased water turbidity and streambed sedimentation degrades fish breeding and feeding habitat. Watershed management practices, such as proper grazing and erosion control measures, could be implemented to reduce sediment entering the Ventura River system. Non-point pollution sources should be reduced, eliminated, or the effluent from them treated. Treatment may include de-greasing basins or routing effluent through the municipal sanitation system. A public education program informing the public about urban pollution impacts to habitat from non-point sources should be developed and implemented. The benefit would be improved water quality and increased wildlife habitat value. The cost associated with overall watershed management, treatment of point source pollution, identification and treatment of non-point source pollution would be high. Disadvantages include high costs and the increased management and monitoring procedures.

5. **Construct weirs in low flow channel** - Construction of a system of weirs in the low flow channel upstream of the Main Street Bridge could retain freshwater inflow and support additional wetland and riparian habitat creation. The weirs would potentially do three things: (1) retain water for removal of nutrients (e.g., through vegetative growth or settlement to the sediments) prior to reaching the lower estuary/lagoon; (2) further reduce the amount of water (through evapotranspiration) reaching the estuary/lagoon; and (3) maintain water levels sufficient to support riparian vegetation. The weirs would be constructed of concrete with a removable flash board design so water levels could be adjusted manually. The benefits are improved water quality in the lower estuary/lagoon and continued growth of riparian vegetation. The initial construction costs would be moderate, however, maintenance and repair costs over time will be high. This option is not recommended because weirs would be subjected to damage during major floods and would have to be repaired or replaced following floods and may cause river bed siltation impacting fish spawning areas.

6. **Increased Flow Alternative** - Increased freshwater inflow into the Main Lagoon and nutrient reduction could be achieved by increased releases from upstream reservoirs during summer. This would also decrease the salinity of the lagoon and create favorable conditions for less saline tolerant fishes, such as the tidewater goby. The benefit is increased water quality and improved fish habitat. The cost would be low. The disadvantages are that the reliability of additional freshwater available during the summer season has not been established and increased flows may cause more frequent breaching. Further investigation of the

instream flow requirements and influence of increased freshwater flows on fish habitat using the Instream Flow Incremental Methodology (IFIM) is warranted if additional freshwater sources can be established.

7. **Placement of hydraulic structure** - A culvert could be placed through the sand bar that closes the lagoon mouth in an attempt to connect the lagoon to the open ocean. This would prevent overtopping of the sand bar and catastrophic lagoon opening. The culvert could be a temporary fixture installed in May and removed in October to improve circulation during the summer months. However, this option would require vigilant maintenance to prevent it from filling with sand and is not recommended.

8. **Enlargement of the tidal prism** - An increase in the tidal prism could be achieved in the main lagoon by excavating the area to the west of the main lagoon. However, calculations have shown that the tidal prism could not be increased enough to create a condition where tidal flow maintains an open inlet without excavation of an unrealistically large area (e.g., the entire study area would need to be excavated to mean lower low water). A benefit would be potential shorebird foraging areas. The costs would be high. The disadvantage is total alteration of present conditions and potential loss of habitat. Therefore, this alternative is infeasible.

9. **Removal of non-native vegetation and replace with natives** - Removal of non-native vegetation, especially giant reed and kikuyu grass (*Pennisetum clandestinum*) from along the estuary south of the Southern Pacific railroad could improve habitat conditions. Giant reed could be replaced with bulrushes (*Scirpus* spp.). Kikuyu grass could be replaced with salt grass (*Distichlis spicata*) which would increase habitat value for small mammals. This plant removal and replacement could be integrated with native vegetation replacement on the western river bank within the Seaside Wilderness Park.

10. **Install buffer vegetation using California native plants** - California native trees and shrubs (such as coyote brush, quail bush) could be installed along the eastern edge of the bicycle trail on and at the base of the east bank river levee near the fairgrounds area. Native vegetation will act as a natural buffer to noise and night lighting from the fairgrounds. The benefit is improved wildlife habitat through reduced disturbance and increased feeding, roosting, and nesting area. The cost would be low. No disadvantages were identified.

11. **Controlled access across the river mouth sand bar** - Access across the sand bar could be limited to the beach foreshore area to prevent disturbance to sensitive California least tern and western snowy plover habitat that exists from the beach

backshore across the sand bar to the lagoon. This aspect has been treated in detail in the Seaside Wilderness (Section 3.4).

Recommended alternative

Increasing habitat value in the lagoon requires maintaining summer fresh water flow but decreasing nutrient loading. Nutrient loading can be controlled by reducing nutrient discharge at the OVWTF. The primary method based on costs and overall feasibility appears to be reducing effluent discharge to the river by recycling water for irrigation purposes. To mitigate flow loss from reduced effluent discharge, fresh water from upstream impoundments must be released or reduced diversions must occur. Presumably, reclaimed irrigation water should replace former irrigation water sources, making upstream releases possible.

Secondary Alternative

Nutrient loading in the river from treated effluent could be reduced by filtering the effluent through a constructed wetland retention basin. This option is viewed as less desirable than reclaiming effluent for irrigation because of land acquisition, construction, and maintenance costs. In addition, releases of additional water from upstream sources would be required to replace evapotranspiration losses. This option is viewed more favorably than planned, artificial breaching of the river mouth sand bar, however, because it does not have the habitat management implications associated with artificial breaching.

3.6 LAGOON/RIVER CHANNEL HABITAT MANAGEMENT

Habitat Description

The main river channel (Figure 2, No. 6), consisting of the low flow channel and adjacent floodplain, is important for fishes and other wildlife. However, the channel has been and continues to be subjected to disturbance by both natural and human causes, including

periodic flooding (a natural, uncontrollable element of the river system), channel constriction, flood control maintenance operations, water diversion, and poor water quality due to watershed erosion and pollution.

Enhancement Options

1. **Minimize upstream flood control maintenance operations** - Flood control measures often include channel grading and vegetation removal to decrease channel "roughness". Grading destroys river bed pool and riffle sequences and reduces water quality by increasing water turbidity and thereby reduces habitat for fish breeding, feeding, and refuge. It also results in invasion by non-native plant species. Graded channels and river bed levees are often destroyed during flooding (requiring frequent repair) as natural channels are recreated. Channel grading should be minimized as much as practicable or eliminated if possible.

   Removal of riparian vegetation as a flood control practice is a temporary solution and it degrades fish and wildlife habitat. Mature riparian vegetation, such as willow, usually has a relatively open understory which allows flood flows to pass. Removal of vegetation may decrease channel roughness in the first year, but brushy immature growth in subsequent years may actually increase roughness to levels higher than prior to vegetation removal. Therefore, once mature vegetation is removed frequent removal of immature vegetation mechanically or by use of herbicides is required. Beneficial vegetation removal that will reduce roughness and provide lower flood inundation levels would include removal of large colonies of giant reed (*Arundo donax*). This plant grows in dense tufts and acts as a barrier to flood waters, unlike the open understory of mature willow.

   The benefit of reduced flood control maintenance operations is reduced maintenance costs, and less impact to habitat. Costs associated with removal of undesirable vegetation is low. The disadvantage is the potential for higher flood levels during initial years of revegetation. Further flood hazard investigation is warranted in order to determine the impact of increased roughness on flood levels.

2. **Prohibit upstream river bed mining operations** - The Southern Pacific Milling Company was operating a sand and gravel mining and washing operation upstream of the project area. The operation was to be discontinued by the end of 1992 and would be followed by a stream restoration program. The washing operation caused increased turbidity in water and converted sand, gravel, and

cobble substrates below the operation to silt. Stream channelization from mining reduced aquatic habitat diversity (e.g., loss of pool-riffle sequences and natural overhanging banks). Therefore, future in channel mining operations should be prohibited. The benefit will be the formation of stable channel features and increased wildlife habitat value. Cost would be negligible (except for the loss of aggregate source). No disadvantages were identified.

3. **Improve water quality** - Factors affecting water quality issues are similar to those discussed in Lower Estuary Options 1, 2, 4, 5, and 6.

Recommended alternative

The Ventura River is a dynamic river system with important wildlife habitat value. Catastrophic flooding has occurred many times in the past resulting in the construction of flood control features (e.g., levees) as the adjacent floodplains were developed. Flood control, however, is not compatible with habitat improvement. To enhance habitat value, flood control measures, including construction of structures, channel grading and removal of mature, native vegetation, should be minimized in the river channel. By allowing native vegetation to mature, channel roughness should decrease allowing greater floodflow capacity. Consistent removal of foreign materials from the river channel which could block floodflows, such as large colonies of non-native vegetation like giant reed and car bodies and debris, may also increase floodflow capacity. Further work is warrented to determine the effects of proposed management alternatives on flood levels. Minimal disturbance combined with native vegetation maturation will enhance wildlife value.

In the past river bed mining operations have decreased fish habitat value in the river. With closure of the S. P. Milling mining operation and subsequent restoration, fish habitat value will benefit. To maintain habitat value in the future, river bed mining should be prohibited.

Improvements to water quality through reduced nutrient loading will benefit fish using the river channel and lower estuary. The recommended method of reducing nutrient loading

while maintaining fresh water flow is reduced discharge from the Ojai Valley Water Treatment Facility (discussed in more detail under Lower Estuary, Option 1).

4.0 PUBLIC ACCESS OPPORTUNITIES

Existing public access facilities and uses were documented in the report on existing conditions. The objective of this section of the report is to evaluate the various options available to the City and State Parks and to present a recommended alternative for implementation. Options are considered for the location and construction of interpretive/educational facility, riparian trail, second mouth viewing platform, riparian and lagoon viewing platform, beach access, dune trail systems, Seaside Wilderness Park access, bike path options, river mouth access, and the Main Street parking lot kiosk. Also discussed in this section are options for mitigating impacts of the floodplain inhabitants on wildlife resources and a review of possible management and maintenance options. A summary elevation of these various alternatives is provided in Table 3.

4.1 INTERPRETIVE/EDUCATIONAL FACILITY OPTIONS

1. **Interpretive Center Complex** - The Interpretive Center (Figure 3, No. 2) will provide space for an entry lobby, restrooms, interpretive displays, book sales, a forty seat lecture area, administrative offices, storage, and a teaching classroom/laboratory. The center will be 2500 to 3000 square feet. An architectural style that reflects the early adobe architecture of the Ventura area and visual integration with existing structures at Emma Wood State Beach will be the criteria for design of the center. The site, located on existing state park property, was selected because it provides easy vehicle access to the center while providing pedestrian access to the existing/proposed trail system. In addition, the location has minimal visual impact on the Highway One view shed, and the buildings can be placed above the 100 year floodplain. This alternative will greatly improve the quality of the interpretive experience in the Ventura Estuary. Costs for construction of the center range between $400,000 and $500,000. Operation and maintenance costs must also be considered.

2. **Interpretive Center Parking** - A parking lot (Figure 3, No. 1) for the

Interpretive Center Complex can be located between the center and the existing State Park entry road. Space is available for 35 cars and one school bus. The lot will be paved and striped and have concrete curbs. Easily accessible parking will not only invite the public to enjoy and learn at the interpretive center, it will discourage pedestrian trampling through sensitive habitat areas to reach the center. Costs for construction of the parking lot are expected to be $75,000 to $90,000.

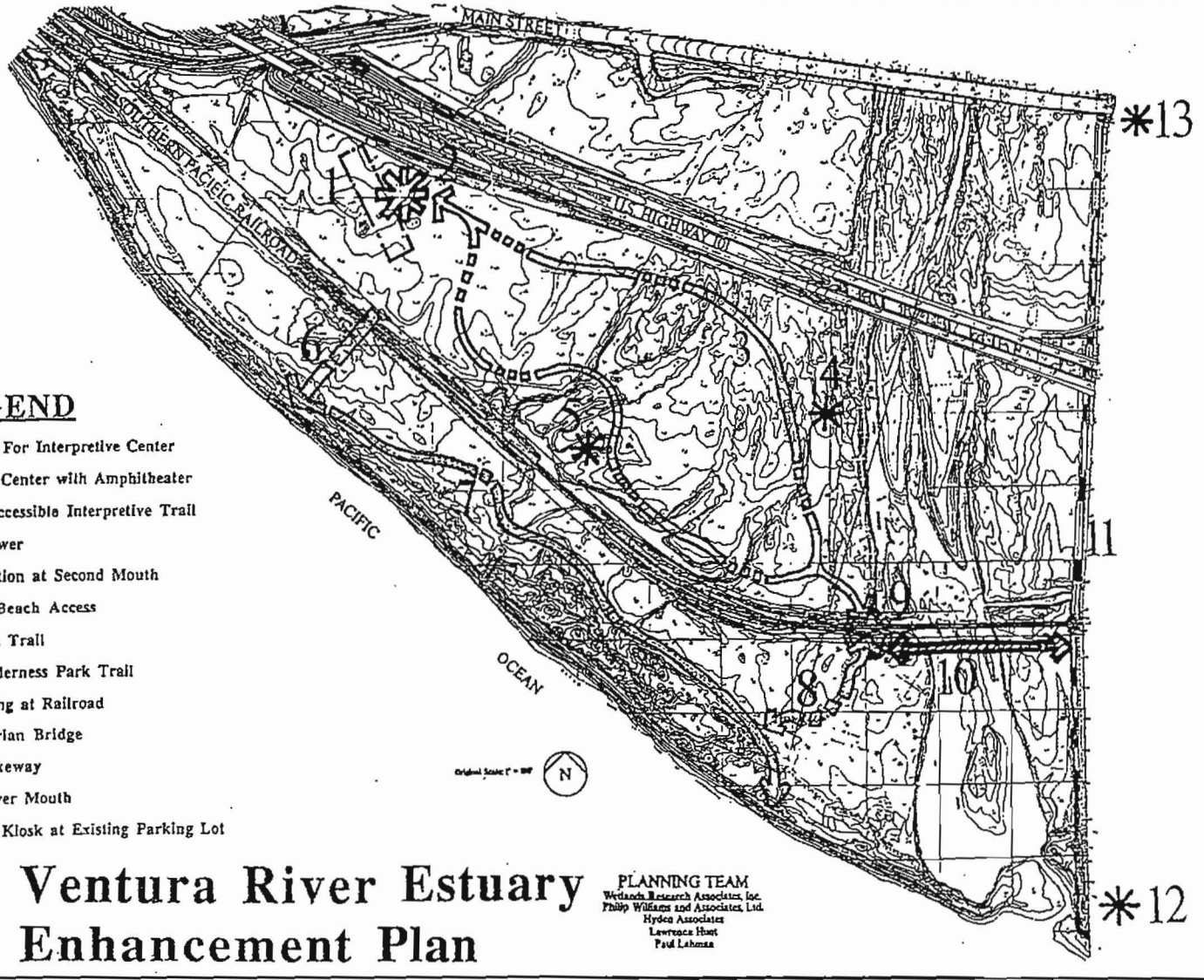
3. **Outdoor Amphitheater and Classroom** - An amphitheater designed as a lecture space or outdoor classroom can be placed in the vicinity of the Interpretive Center Complex, providing space for outdoor lectures and demonstrations. It will also serve as a staging area for docent-led trips into the estuary. The amphitheater will add to the public's interpretive experience, and encourage more group activity in the area. Costs for the amphitheater construction and maintenance will be moderate.

4. **Interpretive Center Plant Screening** - Screen planting using native plants representing the transitional riparian scrub/shrub and woodlands will provide visual screening of the Interpretive Center Complex from the freeway, and also provide additional opportunities for interpretation. The cost for planting and maintenance will be low.

5. **State Park Kiosk** - An interpretive/education element within Emma Woods State Park can be achieved by upgrading the existing interpretive kiosk. The kiosk will be a four sided structure designed in an architectural style consistent with other state parks, having space for interpretive panels, information about the City's interpretive programs, and other appropriate information. The upgrade will cost $20,000 to $35,000. The disadvantage of this is it does not promote additional interpretive programming, nor does it support the City's award winning interpretive outreach program.

4.2 RIPARIAN TRAIL OPTIONS

1. **Handicap-Accessible Trail** - A handicap accessible interpretive trail (Figure 3, No. 3) approximately eight feet wide is proposed for the riparian area. The surface will be designed to accommodate wheelchair access (e.g., soil cement), and will be designed to support maintenance and security vehicles (Figure 4). The design will meet the requirements of the State and Federal accessibility regulations. The alignment will take maximum advantage of the habitat diversity and various views and vistas of the area, while controlling public access and associated negative impacts. In addition it will create an opportunity for



LEGEND

1 Parking Lot For Interpretive Center
2 Interpretive Center with Amphitheater
3 Handicap Accessible Interpretive Trail
4 Viewing Tower
5 Viewing Station at Second Mouth
6 Boardwalk Beach Access
7 Dune Access Trail
8 Seaside Wilderness Park Trail
9 Trail Crossing at Railroad
10 New Pedestrian Bridge
11 Existing Bikeway
12. Kiosk at River Mouth
13 Interpretive Kiosk at Existing Parking Lot

Ventura River Estuary Enhancement Plan

PLANNING TEAM
Wetlands Research Associates, Inc.
Philip Williams and Associates, Ltd.
Hydea Associates
Lawrence Hunt
Paul Lahmann

Figure 3. Features of public access plan for the Ventura River Enhancement Project.

Wetlands Research Associates, Inc.

education and revenue generation as the public passes through a control point. The cost for construction of the paved trail is estimated at $200,000. Additional costs will be expected for maintenance.

2. **Eliminate existing trails** - Existing trails in the riparian area will be eliminated and replanted with native vegetation. Vegetation and/or post and cable barriers will block secondary trail access from the Riparian Trail. This will discourage public access in sensitive habitat, and decrease maintenance costs for litter control and trail repair.

3. **Interpretive Monuments** - Interpretive monuments displaying themes described in "Botanical Resources at Emma Wood State Beach and the Ventura River Estuary, California : Inventory and Management" can be located along the trail. This will provide the public with greater opportunities for education while allowing them to explore the habitat at their own pace. This will also eliminate the need to have staff available to teach interpretive themes in this area. The cost for construction and maintenance will be moderate.

4. **Interpretive Pamphlet System** - An interpretive pamphlet and sign post system can be designed for the Riparian Trail. The cost for this type of interpretive education is minimal. Costs can be offset with a voluntary fee charged for the pamphlets.

5. **Compacted earth Riparian Trail** - A trail will be created as described in Option 1, but the trail will not be paved or regraded to handicap standards. This is a disadvantage since it will not be considered handicap accessible. The cost of this option is $30,000 to $60,000.

4.3 SECOND MOUTH VIEWING STATION OPTIONS

1. **Second Mouth Viewing Station** - A viewing station (Figure 3, No. 5) overlooking the Second Mouth can be designed as a feature of the Riparian Trail. Benches, interpretive signs, and railings will provide individuals and small unorganized groups a view and basic education of the natural processes and wildlife that inhabit the second mouth area, and also be available to larger organized groups led by a docent.

   The viewing station will be designed to maximize views into the second mouth and minimize the disturbance created by visitors to the habitat. The structure will blend into the natural environment, be durable, and easily repaired or replaced. Construction cost estimates range from $7,000 and $12,000.

4.4 RIPARIAN TRAIL VIEWING PLATFORM OPTIONS

1. **Handicap-Accessible Viewing Platform** - A raised viewing platform, located at the midpoint of the Riparian Trail (Figure 3, No. 4), will provide a 360 degree view of the study area. This will also orient the visitor to other park facilities and encourage visitors remain on the trail. The viewing platform will be similar to those in U.S. Fish and Wildlife preserves, using a combination of grading and ramps to provide handicap accessibility. Visual impact of the platform will be reduced through careful site selection, use of appropriate building materials, and design detail. Construction costs would be $40,000 to $70,000, including necessary erosion protection for the earthen berms used for the ramps.

2. **Compacted earth Viewing Platform** - A raised viewing platform that is not handicap accessible can be constructed at the same location as discussed in Option 1. This unpaved platform would preclude use by physically limited individuals and reduce the interpretive experience available to them. The cost would be $30,000 to $60,000.

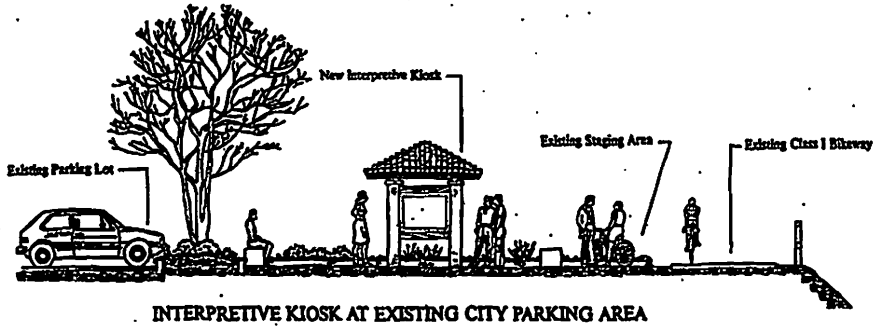
4.5 BEACH ACCESS OPTIONS

1. **Boardwalk Beach Trail** - Access from the campground area to the beach (Figure 3, No. 6) is a main recreation route. A boardwalk (Figure 4) constructed along this route will facilitate access to the beach and lessen human impacts to the sensitive dune habitat. The boardwalk will be from six to eight feet wide and similar to other State Park coastal boardwalks. Cost for construction is estimated to be $50,000 to $60,000. Additional costs to monitor effectiveness of this option may be considered.

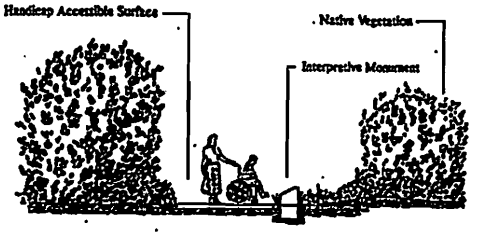
2. **Post and Cable Beach Trail** - Visitor traffic from the campground to the beach can be directed by a post and cable barrier and directional signs. This access system may be as effective as a boardwalk for controlling pedestrian traffic on the dunes. This option could be implemented as a first phase approach to controlled beach access, and monitored to assess impacts to the dunes. This option will cost approximately $10,000.

4.6 DUNE & BEACH TRAIL OPTIONS

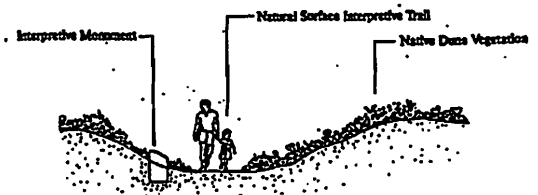
1. **Post and Cable Dune Trail** - Beach and dune access (Figure 3, No. 7) will be controlled along the existing dune path with informational signs at entry points and directional signs along the path alignment. In addition, a post and cable barrier will be constructed at the foot of the dune. Additional signs and railings



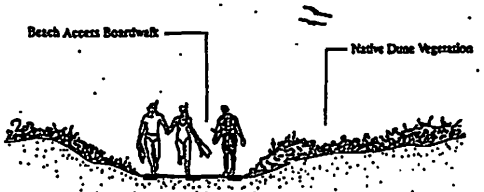
INTERPRETIVE KIOSK AT EXISTING CITY PARKING AREA



HANDICAP ACCESSIBLE INTERPRETIVE TRAIL



INTERPRETIVE TRAIL



BEACH ACCESS BOARDWALK

Sections
Ventura River Estuary Enhancement Plan

Figure 4. Cross sections of various public access features for the Ventura River Enhancement Project.

Wetlands Research Associates, Inc.

could be used to direct visitors away from the more sensitive areas adjacent to the dune path. Since vandalism is considered a possibility in this area, trail signs and barriers should be designed to be low cost and easily repaired or replaced. The estimated cost of this option is $15,000 to $25,000.

2. **Boardwalk Dune Trail** - A boardwalk could be placed along the existing dunes trail. Boardwalk paths for beach visitors are very effective in controlling foot traffic in sensitive habitats. Beach visitors can be informed about sensitive habitat issues by the placement of informational signs at strategic points, and deterred from unguided access by railings. The lack of security in this area may lead to boardwalk vandalism. This option will cost $60,000 to $75,000.

3. **Limited Access Dune Trail** - Pedestrian access can be limited to docent led excursions only. This alternative would require more substantial railing barriers along the primary beach access boardwalk, as well as regulatory signs. Additional security surveillance may be necessary to prevent dune trespass. A substantial number of visitors may be denied opportunity for interpretation of dune habitat with this option. The estimated cost is $3,000 to $7,000.

4.7 SEASIDE WILDERNESS PARK TRAIL OPTIONS

1. **Seaside Wilderness Park Trail** - The compacted earth trail (Figure 3, No. 8), four to six feet wide, would offer views of various habitats including the Ventura River mouth, coastal dunes, and the ocean, and would have interpretive monuments similar to those used on the Riparian Trail. Interpretive themes would include biological, geological and historical site information. Trail access points would avoid sensitive least tern roosting and nesting areas. Removable regulatory signs at entry points and the development of an honor system for trail visitors via informational, interpretive, and regulatory signs will inform visitors and control access during nesting season. The trail could join the Riparian Trail to the north and the Dune and Beach Trail to the west. A connection with the Riparian Trail would require a crossing at the Southern Pacific Railroad. Permission from and coordination with Southern Pacific would be necessary to implement this option. Costs for construction of this trail system will be approximately $10,000 to $25,000.

2. **Limited Access Seaside Wilderness Park Trail** - Elimination of unguided access in this area would be accomplished by use of cable and post barriers, regulatory signs, and regular security patrols. The cost of this option will also range from $10,000 to $25,000, not including docent and security staffing costs.

3. **At-grade Crossing of Railroad** - An at-grade crossing (Figure 3, No. 9) of the Southern Pacific Railroad similar to that at the northern point of the State Park will join the Riparian Trail and the Seaside Wilderness Park Trail. This crossing will not require extensive construction and maintenance costs.

4. **Railroad Undercrossing** - An undercrossing could be constructed beneath the railroad. This would ensure greater public safety than an at-grade crossing, but poses flood hazards. Erosion would be a particular problem during major flood events as flood flows may be directed through the undercrossing. Costs for implementing this option would be substantial, and construction integrity of the tunnel would have to be monitored following floods.

5. **Railroad Overcrossing** - An overhead crossing of the Southern Pacific Railroad Bridge connecting the Riparian Trail and the Seaside Wilderness Park Trail could be constructed. This option is not feasible because the height of the bridge necessary to clear the railroad safely would have negative impacts on the study area viewshed and is not consistent with the enhancement plan goals. In addition, construction costs would be high.

6. **No Public Access** - Access to Seaside Wilderness Park via the railroad bridge is discouraged and an interpretive trail is not constructed. A crossing of the railroad from the Riparian Trail is not necessary. Access is further discouraged by installation of a fence along the western side of the Southern Pacific Railroad Bridge, and elimination of the pedestrian walkway on the bridge. The fence construction will cost $30,000 to $40,000.

4.8 SOUTHERN PACIFIC RAILROAD BRIDGE/BIKE PATH OPTIONS

1. **Pedestrian River Crossing** - A new pedestrian bridge across the river south of the existing railroad bridge (Figure 3, No. 10) would connect the existing bike path on the river's east bank to the Seaside Wilderness Park Trail. Bike access across this bridge into sensitive habitats would be discouraged using a combination of regulatory signs and bridge design. A secure bike parking area would be required near the bridge crossing. This option is only feasible when integrated with the Riparian Trail and the Seaside Wilderness Park Trail. It will require an operational agreement between the City and the State Park. Estimated cost for construction is $275,000 to $350,000.

2. **Re-route Existing Bike Path** - The bicycle path will be re-routed beneath the railroad bridge. The existing bridge catwalk will be removed. This would prevent direct access to the railroad crossing, and would eliminate conflicts

between bicycles, pedestrians, and railroad traffic. The design may require reconstruction of the flood control levee at the bridge such that the undercrossing will withstand floods. The undercrossing must also be above the high water level in the lagoon when the river mouth is closed. This option will cost from $100,000 to $150,000.

3. **Prevent Bike Crossings** - A series of warning and regulatory signs can be placed at the intersection of the railroad bridge and bike path to prevent/control access across the bridge. This option will cost $3,000 to $5,000.

4.9 OPTIONS FOR ACCESS CONTROL AT RIVER MOUTH

1. **River Mouth Attended Kiosk** - Access at the river mouth (Figure 3, No. 12) can be controlled through an interpretive program that will educate beach visitors about the sensitive nature of the river mouth habitat. The river mouth sand bar will be closed to public use, however, restricted beach access between the beach foreshore and surf zone from the river mouth to the Emma Wood State Beach/Seaside Wilderness Park boundary will be allowed (See Section 3.0). In addition, the public can be made aware of alternative access points east of the river mouth. An interpretive kiosk is proposed with several interpretive panels and a map showing access points from the pedestrian bridge via Seaside Wilderness Park and Emma Woods State Park to the beach area. A barrier railing, regulatory signs, and benches will be incorporated into the site design. The kiosk will be designed in the early adobe architecture of the Ventura area. A docent will be stationed at this location during peak use times to interpret the natural features of the area and to direct beach visitors to the pedestrian bridge and Emma Woods State Park access points. This option cost is estimated to be $35,000. This does not include staff time for a uniformed docent.

2. **Portable Interpretive Center** - A portable interpretive center can be located near the river mouth, and be highly visible to the many park visitors that pass through this area. A trailer/portable building could be relocated off-site in the off season and during severe flooding. Interpretive staff could guide pedestrian crossing of the river mouth through education and enforcement. In addition, a barrier railing and regulatory signs would be located at the river mouth sand bar to guide access. This alternative would not preclude future development of a full scale interpretive center within Emma Woods State Park. A portable interpretive center will cost between $100,000 and $150,000. The barrier/regulatory sign system will cost $15,000 to $20,000.

3. **Non-attended Kiosk** - A kiosk, barrier railing and regulatory signs would be constructed as in Option 1, however, a docent would not attend this location during peak use times. This option has the advantage of being relatively low cost while still offering the public opportunities for interpretation of this sensitive habitat. This option will cost approximately $35,000.

4. **No Public Access** - A barrier fence and regulatory signs will be placed at the river mouth at a point most frequently crossed by visitors. While preserving and protecting sensitive habitat, this option does meet the public access goals of the plan. Local visitors to the park will still attempt to access this area, and the absence of interpretative information will not promote sensitive habitat awareness. Costs range from $15,000 to $20,000.

4.10 MAIN STREET PARKING LOT KIOSK OPTIONS

1. **Main Street Parking Lot Kiosk** - An interpretive kiosk (Figure 4) similar to other kiosks proposed in the plan would be placed in the area of the Main Street parking lot (Figure 3, No. 13). This will allow integration of estuary interpretation into the existing recreation function of the bikeway, educating a substantial number of visitors about sensitive habitats without decreasing the operating efficiency and safety of the bikeway, or facilitating access to the estuary.

2. **Informational and Directional Signs** - Signs directing the visitor to trail and beach access points, and small interpretive displays can be placed in the Main Street parking lot at the access point to the study area. These signs would be similar in design to interpretive signs found in State and National Park overlooks. The costs of construction and maintenance of these signs is low, though the possibility of vandalism in this unprotected area must be considered.

4.11 OPTIONS FOR MITIGATING IMPACTS OF FLOODPLAIN INHABITANTS

1. **Portable Facilities** - Trash dumpsters and portable toilets will be placed at the Main Street parking lot for use by the floodplain inhabitants, thereby reducing the adverse impacts on the natural resources by human inhabitants. This element has the added benefit of improving the living conditions of the floodplain inhabitants. Maintenance of these facilities will be the responsibility of City staff. Implementation costs for this option are minimal.

2. **Off-site Campground** - A location off-site will be acquired and developed to provide camping facilities for floodplain inhabitants currently located in the river mouth area. In addition, a monitoring program in the river mouth area will be

implemented to direct additional itinerant campers to the off-site campground. Participation in the monitoring program by social service, non-profit, and law enforcement organizations will be necessary to implement and sustain the relocation. This option is desirable because it greatly reduces the impact of human disturbance on the area's resources. It will improve the living conditions for those being relocated. However, it is expensive to implement, and the law enforcement element necessary is costly. There are also public policy implications to be considered.

3. **Re-location to State Park Campground** - All or a portion of the existing State Park campground shall be dedicated for use by the current floodplain inhabitants. Some separation of the proposed campground facility and existing State Park functions will be necessary for operational and aesthetic reasons. As with option 2, a monitoring program for the river mouth area will be necessary to direct additional campers to this new facility. Law enforcement costs will be substantial, and political implications must be taken into account, Furthermore, there will be a significant loss in revenue to the park system when campgrounds are no longer generating fees, and this loss must be made up in other ways.

4.12 OPERATIONS AND MAINTENANCE OPTIONS

1. **One Entity Management** - One agency will be designated to operate and maintain all of the public access facilities in the study area. This will eliminate duplication of public access and habitat enhancement functions and policies. The selected agency would oversee existing recreational functions such as camping and bike path use, as well as new elements such as the interpretive center and habitat enhancements.

   Funding for development, operations and maintenance will need to be generated by user fees. Additional funding may be obtained through a non-profit organization eligible for grants not available to government agencies. In addition, this agency may develop a volunteer staff to assist in operations and maintenance. It can also create fund raising programs and develop a community outreach program to inform and educate the public about the estuary's public access and enhancement facilities and programs. Sacramento County's Effie Yeaw Nature Center is associated with such an organization.

2. **Management Committee** - A management committee consisting of professional staff from the State Park and City of Buenaventura can be organized. Committee members would meet on a regular basis to coordinate policy and integrate operations and maintenance functions between the agencies. The disadvantage of this option is the difficulty in meeting the disparate goals of several agencies.

4.13 PUBLIC ACCESS AND FACILITIES SUMMARY

The public access and facilities concepts presented in this plan all have the goal of creating an acceptable balance between public access and recreation, resource preservation and enhancement, public safety and security. Construction cost and operations and maintenance costs are also considered.

Some of the alternatives discussed are interdependent with respect to public access and also with consideration of the larger preservation and enhancement goals, i.e., a viewing station at the Second Mouth would not be necessary if the natural resources at the second mouth aren't enhanced. Therefore, alternatives discussed for each location are not necessarily interchangeable with other options.

In addition to the options listed, there is also the choice of maintaining the status quo for each location. In this analysis, the status quo is not considered a desirable alternative.

Recommended Alternative

The preferred alternative, consists of a well integrated public access system which facilitates all existing public access uses, patterns, and programs. This alternative includes the following elements:

1. Interpretive Center Complex with outdoor amphitheater/classroom
2. Handicap accessible trail in the riparian area of Emma Wood State Park
3. Handicap accessible viewing platform along the Riparian Trail
4. Second mouth viewing station
5. .Boardwalk Beach Trail from Emma Wood State Park
6. Post and Cable Dune Trail with directional, interpretative, and regulatory signs

7. Interpretive trail consisting of informational and regulatory signs in the Seaside Wilderness Park.

8. A trail connection between the Riparian Trail and Seaside Wilderness Park Trail across the Southern Pacific railroad tracks.

9. An interpretive kiosk with barrier railing near the bikeway and river mouth, with an interpretive/security attendant during peak visitor season.

10. Interpretive kiosk at the Main Street Parking area.

11. Dumpsters and portable toilets at the Main Street Parking area to improve living conditions of the floodplain inhabitants in the river mouth area, reducing impacts on the river habitats.

This alternative's strong emphasis on public access organizes and facilitates existing use patterns. It has a strong emphasis on protection of natural resources, but does not provide the optimum solution for preservation and enhancement for all habitats, because to do so would eliminate public access in many locations. However, the natural resource aspects are greatly enhanced by creating facilities that accommodate existing interpretive programs, and that will provide extensive self-guided interpretive experiences, largely accessible to the physically handicapped park visitors.

The proposed interpretive center, outdoor classroom, and viewing tower increase the opportunity for on- site education and interpretation. However, this element also increases the construction and operations costs of the park. Impacts on visual resources altered by the proposed interpretive center and viewing tower will be mitigated by architectural treatments and placement.

This alternative deals practically with human disturbance by providing minimum sanitation and refuse facilities in the area of the Main Street parking lot. Mitigation of the impacts of the floodplain inhabitants is accomplished within the scope of a public access plan.

This solution addresses the issue within realistic physical, financial, and operational constraints.

The high degree of improved public access and interpretation proposed by this alternative has a substantial impact on construction costs and operations and maintenance budgets. This impact can be reduced by restructuring user fees and phasing of the proposed improvements, particularly the interpretive center.

Optimum operations and maintenance system for this alternative will be achieved under one agency. Goals, objectives, and policies for the entire study area could be easily refined and implemented. This is particularly important for design elements impacting both the State and City Parks. Operations and maintenance functions will probably be more efficient and economical. The City is the preferred entity to manage the study area. The State has reached similar agreements in comparable situations which have worked well.

Secondary Alternative

The secondary alternative sacrifices some aspects of public access for habitat and cost considerations. This alternative includes the following elements:

1. Unpaved (non-handicap accessible) trail in the riparian area of Emma Wood State Park
2. Viewing platform along the Riparian Trail without handicap accessible ramp
3. No viewing station at Second Mouth
4. Post and Cable Beach Trail beginning at Emma Wood State Park
5. Dune trail consisting of boardwalk, information signs for direction and interpretation and regulatory signs for habitat protection
6. No interpretive trail in the Seaside Wilderness Park
7. Realignment of the existing bikeway beneath the Southern Pacific railroad bridge and regulatory signs to strongly discourage crossing the bridge, with removal or blocking

of existing bridge catwalk

8. A barrier fence along the railroad easement on the west side of the bridge to discourage pedestrian and bicycle traffic.

9. A portable interpretive trailer for the area adjacent to the river mouth and the existing bikeway

10. Information and directional signs at the Main Street Parking area.

11. Development of an alternative, off site campground for the homeless population residing in the river mouth area.

This alternative eliminates the permanent interpretive center, primarily to save construction and operations costs. The trail in the riparian area will be unpaved and thus not handicap accessible, again saving construction and maintenance costs. The viewing tower adjacent to the riparian trail remains but will not be handicap accessible, providing cost savings as well.

The dune trail boardwalk without barrier posts and cable is proposed to direct trail traffic and protect the dune habitat. Trail development and unguided public access in the Seaside Wilderness Park is entirely eliminated except for beach access. A portable interpretive trailer is proposed for the area adjacent to the river mouth and the existing bikeway. Information provided at this interpretive trailer will discourage crossing the river mouth area. Regulatory signs will also be placed at existing crossing points. The interpretive trailer will be stored off-site when not in use.

The current public use of the Southern Pacific railroad bridge to access the Seaside Wilderness Park and Emma Wood State Beach will be discouraged by re-routing of the existing bikeway beneath the bridge and the placement of regulatory signs at the bridge entrance. In addition, a barrier fence along the railroad easement on the west side of the bridge is proposed to discourage pedestrian and bicycle traffic. Elimination of the catwalk at the bridge will also

be explored with Southern Pacific.

The Main Street parking lot kiosk is similar to that proposed in the preferred alternative.

The floodplain inhabitants will be relocated to a newly created off-site campground. Additional itinerant campers entering the river mouth area will be directed to the off-site campground by social service, non-profit, and law enforcement organizations.

Operations and maintenance responsibilities will remain under the separate jurisdictions of the State and City. However, a management group consisting of professional staff from each agency will meet regularly to coordinate development, operations, and maintenance efforts.

Tertiary Alternative

The third alternative has minimum public access development, attempting to discourage public access wherever it may conflict with habitat preservation.

This alternative includes the following elements:

1. An interpretive kiosk at the beginning of the Riparian Trail.
2. Un-paved Riparian Trail in the State Park.
3. No viewing platform along the Riparian Trail.
4. No second mouth viewing station
5. Post and Cable Beach Trail beginning at Emma Wood State Park
6. Dune Trail is eliminated and regulatory signs with barrier post and cable are placed at the main beach access to discourage access to the dunes
7. No interpretive trail in the Seaside Wilderness Park
8. Existing bikeway alignment remains and crossing at the Southern Pacific railroad bridge is discouraged by regulatory signs

9. A barrier fence with regulatory signs is located along the railroad easement on the west side of the existing bridge to discourage pedestrian and bicycle access

10. A barrier fence with regulatory signs is proposed adjacent to the river mouth and the existing bikeway to discourage crossing the river mouth

11. No change to the Main Street Parking area

12. The Emma Wood State Beach campground is dedicated for use by floodplain inhabitants

Under this alternative, conflicts between natural resource preservation and enhancement and public access are resolved by excluding the public access alternative. Public access is restricted primarily to established routes with informational and directional signs. Use of unauthorized routes is discouraged with a combination of barriers, signs and replanting of native plants. Existing visual resources are not affected significantly in this alternative.

Existing City and State recreational use patterns are notably altered under this alternative. Such alterations include attempts to eliminate unguided use of the existing dune and Seaside Wilderness Park paths. Crossing of the Southern Pacific railroad bridge, and crossing at the river mouth are also discouraged. Barrier fences and regulatory signs are the main tools used to redirect public access under this alternative.

Natural resource interpretation will depend on existing City and State programs.

The impact of the floodplain inhabitants on the study area is reduced by creating a temporary camp on a portion of the existing State Park campground. This relocation would eliminate many of the human habitation impacts on the habitats of the study area. However, there are three assumptions necessary to implementation of this option: 1) the State Parks will allow this conversion, 2) additional revenue could be acquired to offset the loss in camping revenue, and 3) the area vacated by the relocated floodplain inhabitants would not be occupied

by a new group.

The costs for construction of this alternative are minimal, however, operations and maintenance costs could be substantial if efforts to close trails in sensitive habitats and eliminate crossings are considered.

Summary

The relationship between public access and natural resources in the preferred alternative is a good balance. It has a strong emphasis on natural resource protection while providing improved public access. This alternative also takes a pro-active approach to resource protection through a system of educational elements.

This alternative recognizes existing public access patterns, both authorized and unauthorized, and reorganizes them into a comprehensive public access plan. Facilitating established public access patterns when they are not in direct conflict with natural resource goals is an important aspect in the development of a successful plan. The recommendations for physical improvements for the floodplain inhabitants in the area are the most practical given the complexity of the problem and the resources available to a habitat enhancement and public access plan. The proposed management system eliminates the conflicts that are inherent when two agencies with similar missions and responsibilities share jurisdiction over one natural resource and public access unit.

The second alternative is similar in many ways to the preferred alternative, however, attempts to reduce construction and maintenance costs lessen the public access opportunities available in the first alternative. Relocation of the floodplain inhabitants requires a substantial investment of financial resources. In addition, it demands a considerable effort by the resource management agencies to prevent the occupation of the river mouth area by additional itinerant campers.

The third alternative provides limited public access facilities. The enforcement approach to eliminating public access to sensitive habitats requires a long term commitment of staff time to policing tasks. This time commitment could be better utilized by educational and interpretive staff as recommended in the first two alternatives.

The preferred alternative results in a reasonable and practical balance between resource protection and public access. With strong emphasis on interpretation and education, this alternative will promote a positive relationship between visitors and the natural resources of the study area. In addition, the knowledge and respect the park visitors achieve through these programs will be passed on to others.

The benefits of the proposed public access system, which promotes understanding of the natural resources within the framework of existing use patterns, will mitigate the impacts.

5.0 RESEARCH OPPORTUNITIES

"The biological richness of the study area is directly related to the interfacing of four wetland systems (Marine, Estuarine, Riverine, and Palustrine) and adjacent uplands." (Ferren et. al. 1990) The botanical richness of the area in turn leads to high faunal diversity. Despite urbanization and transportation corridors that have isolated and reduced the size of the Ventura River delta, the faunal resources of the region still provide a number of important research and educational opportunities. An inventory of faunal resources of the study area is still incomplete.

Future inventory work should focus on:

1. Documenting the seasonal species diversity and density of aquatic invertebrates in the lower Ventura River and estuary on a seasonal basis and in relation to temporal changes in salinities and periodic flooding. These organisms form the food base for all fish and a number of semi-aquatic and terrestrial reptiles, birds and mammals and are an important means of assessing the biological conditions of a river system.

2. Documenting species diversity of terrestrial insects, including a number of sensitive species that may inhabit coastal dune and riparian woodland habitat on the study area, such as the Monarch Butterfly (*Danaus plexippus*), Globose Dune Beetle (*Coelus globosus*) a Federal Category 2 taxon, and the Sandy Beach Tiger Beetle (*Cindindela hirticollis gravida*) which, according to Ferren et. al. (1990), historically occurred in the coastal dunes of the region (NDDB 1988). Restoration of the coastal dunes on the study area could be documented by monitoring the presence and densities of dune obligates, such as the Globose Dune Beetle. If this species is found to be absent from the site, it could be reintroduced from nearby populations. Its continued presence in dunes is an indicator of "healthy", stabilized dune habitat (R. Arnold, pers. comm.). Riparian woodlands adjacent to the Ventura River provide suitable winter roosting sites for Monarch Butterflies (Hunt 1991). Eucalyptus windrows north of the Main Street bridge and immediately west of the river functioned as important winter roosts for Monarchs. These windrows were removed in March 1991 following a severe freeze the preceding December (Hunt, per. obs.).

3. The Main Street bridge is the largest known bat roost in the area. Additional regional surveys would provide perspective on the regional importance of this roost site. More accurate counts of bats leaving this roost site at dusk should be

conducted in conjunction with mist-netting at different seasons and at points farther upstream. Bat use of the Main Street bridge should be monitored on a seasonal basis to determine if the species found to date remain in this area and are active year-round. The three species of bats found during the 3 July 1992 bar survey are migratory at many coastal localities, moving to the coast in the spring and inland in the fall and winter where they retreat to deeper crevices to hibernate (P. Brown, pers. comm.). Use of a bat detector at different times of the year would establish baseline information on species presence in the study area. It is likely that the river mouth, estuary and adjacent riparian and scrub habitats provide foraging habitat for a large number of bat species (P.Brown, pers. comm.). If *Plecotus townsendii* or *Eumops perotis* are ever captured in mist nests in the area, they should be radio-tagged and tracked back to their respective roosts.

4. Conduct more extensive trapping to determine the status and distribution of shrews at the project site.

5. Further survey work to determine on-site presence of Gray Fox (*Urocyon cinereocargenteus*) and/or Red Fox (*Vulves vulpes*). The latter species may need to be controlled if it becomes prevalent within the project area.

6. Document the number, timing, and spawning patterns of adult steelhead entering the Ventura River and the rearing and instream movement of juvenile steelhead, including downstream smolt movement. This investigation should utilize accepted survey techniques, such as Fyke nets and electro-fishing and should include a comparative genetic analysis of fishes to identity significant genetic differences between southern, central, and northern California populations.

7. Develop a stream flow model. A stream flow model such as the Instream Flow Incremental Methodology (IFIM) used by the U.S. Fish and Wildlife Service, to determine what levels of surface flows at particular times during the year are necessary to maintain native fishes at self sustaining levels. This could be done in conjunction with water quantity requirements for the lower estuary.

6.0 MANAGEMENT OF THE ESTUARY AS A UNIT

The Ventura River estuary is a natural system linked by overlapping species distributions, water quality and quantity considerations, and human use. The studies prepared for this plan have demonstrated the interdependencies of these factors. The current land management based on ownership fails to consider the means by which a uniform set of policies can be implemented. In addition, external considerations such as sand and gravel mining, flood control management, and treated wastewater discharge need to be addressed in terms of an overall approach to ecological management of the estuary.

A management "unit" should be created for the implementation of the final enhancement plan. The role of the management unit would be to:

1. Protect, enhance, and manage the natural resources of the Ventura River estuary and delta

2. Increase public awareness of the natural resource values of the region

3. Coordinate reviews and comments on impacts to the estuary from upstream and adjacent land uses.

4. Solicit funding for high priority projects.

5. Provide a base for volunteer programs promoting the protection and natural resource management of the estuary.

The need for one management authority has been recognized in previous studies of the estuary by Ferren et al (1990). Possible options are discussed below:

1. **Joint Powers Authority** - Joint Powers Authority might be serve as a vehicle for a single management unit. A JPA is an independent governmental agency with power to acquire land, plan, improve, operate, and maintain property. Under federal tax laws, contributions to the JPA are as tax deductible as contributions to a private charitable 501(c)(3) organization. For example, the JPA for the San Dieguito River Valley in northern San Diego County has established various funds for restoration and recreational enhancement, has initiated an education program, and sponsors programs for estate planning and giving. It is not likely that any of the existing landowners would be willing to transfer their properties to the JPA without compensation; therefore, it is assumed that ownership of the separate parcels would remain the same (unless an agreement is reached for a transfer of property). Generally, JPA's are established among local authorities and consideration of the potential for uniting state and local agencies needs to be explored.

2. **Transfer to State Parks** - Another management option would be the consolidation of the properties under the management of the California Department of Parks and Recreation as recommended by Ferren et al (1990). This would require that DPR acquire privately held lands and take responsibility for management of the Seaside Wilderness Park. The latter should be combined with the Ventura River Group camp as an Ecological Preserve so that appropriate management policies can be set for these areas consistent with the findings of this report. A disadvantage of transfer of management responsibility to DPR is the uncertain future as state budgets for parks are cut. While this may only be a short-term issue, the funds for the management of the Ventura River mouth could easily be lost in the General Fund and not be retrievable. This is true even for funds generated by the campground itself. Given that the project is likely to occur over many years, the "see-saw" nature of the state budget in recent years does not bode well for a state take-over of the project site.

3. **Operation by City of Buenaventura** - A third alternative is the transfer of management to the City of Buenaventura. While the City is also faced with budget shortfalls, it has a more direct interest in the area since it serves City residents as well as brings tourists to the area. The City has an important role in the management of the public access and homeless issue in the project area. The City could also manage the campground and use those funds directly for the management of the river mouth restoration plan. The City could more easily grant a concessionaire the right to operate the campground in exchange for funds to enhance the river mouth. The City is also eligible to receive grant funds from the State Coastal Conservancy whereas other state agencies are not eligible. The

Conservancy is likely to be a major source of funds to this project. The City could also oversee mitigation efforts and funds from the Southern Pacific RR, CalTrans, and the pipeline and telecommunications companies that may be required to provide mitigation for their activities. Finally, the City is in a better position to solicit some funding from the County, the fairgrounds, and the Sanitary District to assure that these entities contribute to habitat restoration as mitigation for past impacts caused by their operations.

4. **Memorandum of Understanding** - A fourth alternative is a weaker union of all landowners through a memorandum of agreement (MOA). The MOA would coordinate activities among the various landowners. A memorandum of agreement (MOA) would need to be signed so that the landowners could agree on the basic goals for the management of the estuary. It is recommended that the goals and objectives within this plan be included in the MOA.

The selection of a management agency is largely a policy decision amongst the various parties. It is recommended that a single agency be charged with overall responsibility and that the key criteria of selection of a preferred arrangement be one in which the funding for implementation is assured to be maintained in a single account dedicated to the use of the Ventura River Estuary Enhancement Program. In addition, the staffing for oversight needs to be guaranteed if the program is to be effective over the long-term.

7.0 POTENTIAL PROJECT FUNDING SOURCES

There are a variety of funding sources available to implement some or all of the recommendations contained in this report. It is anticipated that a majority of the needed funding will come from public sources such as the Coastal Conservancy, State Parks, the City of Buenaventura, and various state and local bond acts. However, there is also the opportunity to tap private funds, especially as mitigation for existing or planned activities. Replacement of the railroad bridge and the pipeline represent projects that may require mitigation for environmental impacts. These mitigation measures would be addressed in the permitting process

and would be required by the Coastal Commission or the Corps of Engineers. The implementation of the mitigation measure would be the responsibility of the applicant; however, the public management agency for the Ventura river mouth could be contracted to conduct the monitoring and management of the restoration measure.

Possible public funding sources include:

Caltrans Environmental Enhancement and Mitigation Program

Recently enacted in 1989, this program provides funding for trails and habitat restoration projects that provide mitigation for the environmental effects of new or expanded transportation facilities. Funds are available if recent transportation improvements/developments have had impacts in the general area (i.e., not necessarily on-site). Funds are available for planning, acquisition, development, and restoration activities for local, state, federal, and non-profit agencies. The maximum grant for a single project is 5 million dollars. Contact Harold F. Waraas, Environmental Enhancement and Mitigation Program, The Resources Agency, 1416 9th Street, Sacramento, 95814.

California Department of Parks and Recreation

The Habitat Conservation Fund was created in 1990 under the California Wildlife Protection Act to provide funds to local public agencies for habitat acquisition, enhancement, and restoration. Funding applies to habitat for threatened and endangered species, wildlife corridors, trails, fish, wetland and riparian habitat. Contact Betty Ettinger, Habitat Conservation Fund, California Department of Parks and Recreation, P.O. Box 942896, Sacramento, 94296-0007, (916) 653-8776.

California State Coastal Conservancy Grants

The Coastal Conservancy awards grants to public agencies and appropriate non-profit organizations to acquire land, restore resources, provide recreational features, and enhance

coastal/bay access. The Conservancy only undertakes projects that impact coastal/bay resources. Contact Joan Cardellino (Shoreline and Public Access Projects) or Reed Holderman (Wetland Enhancement), California State Coastal Conservancy, 1330 Broadway, Suite 1100, Oakland, 94612, (%10) 464-1015.

Wildlife Conservation Board

Funding is provided through the Fish and Wildlife Enhancement Bond Act to correct more severe deficiencies in fish and wildlife habitat in California. Funds are available only for threatened and endangered species. Funds may be used by public agencies only to enhance, develop, or restore flowing waterways for the management of fish outside the coastal zone. Contact John Schmidt, Wildlife Conservation Board, State Department of Fish and Game, 1416 9th Street, Sacramento, 95814.

California Department of Water Resources

Environmental Water Program - created by the Environmental Water Act of 1989 provides funding for enhancement and restoration projects (not studies) which will contribute significant environmental benefits to the state. Grant monies must be matched by either an equal amount of cash, or a combination of cash and in-kind services. Eligible projects include fisheries habitat restoration and enhancement, riparian habitat acquisitions, restoration or enhancement, and wetland habitat acquisitions, restoration of enhancement. Funds are presently allocated for flood control measures (until 1994). For further information contact Phil Wendt (916) 327-1660, Dale Hoffeman-Floerke (916) 327-1661, 1020 9th Street, Sacramento, 95814, or P.O. Box 942836, Sacramento, 94236-0001.

Resources Agency

Environmental License Plate Fund - Offers grants to state agencies, boards or commissions, city or county agencies, the University of California, or private non-profit research organizations to support projects that help preserve or protect California's environment. Eligible

projects include acquisition, restoration or enhancement of resource lands and endangered species, and development of interpretive facilities. All funds are presently allocated for mountain lion/dear habitat. The filing date for application is July 15 each year. For information and applications contact Michele Mercado, Resources Agency, 1416 9th Street, Suite 1311, Sacramento, 95814, (916) 653-5656, FAX (916) 653-8402.

State Water Resources Control Board

Water Quality Management Planning - The State Water Resources Control Board provides water quality management planning grants to state, local, and regional agencies to address a variety of surface and groundwater quality problems. These grants require a 25% non-federal match. Projects most likely to receive funding will focus directly on corrective or preventative actions for water bodies identified as "impacted" in the State's Water Quality Assessment, proposed by agencies with the capacity to perform and complete the proposed work. Projects that are primarily research oriented will not normally be funded. For more information contact Paul Lillebo, State Water Resources Control Board, Division of Water Quality, Water Quality Planning Program, P.O. Box 100, Sacramento, CA 95801-0100, (916) 657-1031

California Department of Conservation

Funding is provided through the California Beverage Container Recycling and Litter Reduction Act. Projects related to market development, recycling activities, and litter reduction are eligible for funding. Statewide non-profits and local conservation organizations, cities, counties, and special districts are eligible to apply. Awards may constitute up to 50 percent of the total project cost, matching other funding sources. Applications are due by June 22. For more information contact Division of Recycling, Program Development and Local Assistance Branch, 801 K Street, 18th Floor, MS-55, Sacramento, CA 95814.

California Department of Boating and Waterways

This concerns funding for a possible beach erosion reduction program, including

structural and non-structural techniques, for the study area. A local community or agency can formally request funding assistance from CDBW by submitting a project feasibility report. Criteria for selection is evaluated followed by potential funding. Contact California Department of Boating and Waterways, Beach Erosion Branch, 1629 "S" Street, Sacramento, CA 95814.

Future Environmental/Conservation Bond Measures

The Planning and Conservation League is sponsoring a bond act (State Parks and Resources) to be included on the June 1994 election ballot. Other bond measures may also be initiated. Bond measures require voter approval, however, and can not be relied upon given the economic climate in California.

Table 1. Analysis of enhancement options for the Ventura River Enhancement Project.

Enhancement Area / Options	Habitat Enhancement	Habitat impact ST/LT		Special Status Species Benefit	Improve Water Quality	Native Species Revegetation	Flood Control	Public Access	Public / (Non-Public Cost)	Phasing Possible
Second Mouth: Replace existing railroad bridge with single span	+	0	+	0	0	0	+	0	($$$)	N
Replace existing railroad bridge with double span	++	0	+	+	0	0	++	+	($$$$)	N
Excavate fresh/brackish lagoon/wetlands	++	-	+	+	+	+	0	+	$$$$	N
Restore habitat by excavation (no bridge expansion)	+	-	0	+	+	+	0	+	$$$	N
Re-vegetate restored lagoon with native plants	++	0	+	+	0	++	0	+	$$	Y
Allow natural plant colonization	+	+	+	+	0	+	0	0	Neg	Y
Construct flood berm	-	+	+	0	0	0	-	0	$$$	N
No action	0	0	0	0	0	0	0	0	Neg	N
Re-route existing pipeline	-	0	+	0	0	0	0	0	($$$)	Y
Upgrade existing pipeline	+	-	0	0	0	0	0	0	($$)	Y
Re-route telecommunications lines	+	0	0	0	0	0	0	0	($$)	Y
Provide public access in restored area	0	0	0	0	0	0	0	++	$	Y

Table 1. Analysis of enhancement options for the Ventura River Enhancement Project (cont.).

Enhancement Area —— Options	Habitat Enhancement	Habitat impact ST/LT		Special Status Species Benefit	Improve Water Quality	Native Species Revegetation	Flood Control	Public Access	Public / (Non-Public Cost)	Phasing Possible
Riparian Area: Remove non-native plants; replace with native species	++	0	+	++	0	++	+	0	$$	Y
Remove invasive non-native plant species only	+	0	0	+	0	+	+	0	$	Y
Expand riparian woodland on western floodplain	+	0	+	++	+	+	+	+	($$)	Y
Create a single interpretive trail; close informal trails	++	0	0	+	0	0	0	++	$$$	Y
Control pets; remove feral animals	+	0	0	+	0	0	0	0	$	Y
Provide security patrols	0	0	0	+	0	0	0	+	$	Y
Provide alternatives for floodplain inhabitants	+	0	0	+	+	0	0	+	$$$	Y
Dune Strand: Enhance dune vegetation	++	-	+	++	0	++	0	0	$$	Y
Expand dune habitat	++	0	+	++	0	+	0	0	$$	Y
Use structures to reduce beach erosion	+	-	0	0	0	0	0	+	$$$$	Y
Reduce erosion with beach nourishment	+	-	+	0	0	0	0	+	$$$$	Y
Control beach access	+	0	+	++	0	0	0	+	$	N

Table 1. Analysis of enhancement optionss for the Ventura River Enhancement Project (cont.).

Enhancement Area ——— Options	Habitat Enhancement	Habitat impact ST/LT		Special Status Species Benefit	Improve Water Quality	Native Species Revegetation	Flood Control	Public Access	Public / (Non-Public Cost)	Phasing Possible
Dune Strand (cont.): Create dune strand trail	+	0	+	+	0	+	0	+	$$	N
Provide docent-led excursions	+	0	0	+	0	0	0	+	$	Y
Prohibit public access	++	-	+	++	0	0	0	--	$	N
Seaside Wilderness Park: Replace non-native plants	++	-	+	++	0	++	0	0	$$	Y
Create interpretive trail	+	0	0	+	0	0	0	++	$	N
Prohibit public access	+	0	0	++	0	0	0	--	$	N
Control beach access across river mouth sandbar	++	0	+	++	0	0	0	+	$	N
Lower Estuary: Decrease nutrient discharge from treatment facility	++	0	0	++	++	0	0	0	$$$$	Y
Decrease nutrient discharge with wetland retention basin	+	-	+	++	++	0	0	0	$$$$	Y
Dilute nutrient load with planned sandbar breaches	-	-	0	--	+	0	0	0	$	Y
Improve water quality from point and non-point pollution	++	0	+	+	++	0	0	0	$$$	Y

Table 1.. Analysis of enhancement options for the Ventura River Enhancement Project (cont.).

Enhancement Area / Options	Habitat Enhancement	Habitat impact ST/LT		Special Status Species Benefit	Improve Water Quality	Native Species Revegetation	Flood Control	Public Access	Public / (Non-Public Cost)	Phasing Possible
Lower Estuary (cont.): Construct weirs in low-flow channel	-	0	+	0	+	0	-	0	$$	N
Increased flow alternative	+	+	+	+	++	0	0	0	$	N
Placement of hydraulic structure	+	-	0	+	+	0	0	0	$$$	Y
Enlarge tidal prism	--	-	-	--	+	0	+	0	$$$$	N
Replace non-native plants with native species	++	0	+	0	0	++	+	0	$$	Y
Install buffer vegetation	+	0	+	+	0	++	0	0	$	Y
Control access across river mouth sandbar	++	0	0	++	0	0	0	-	$	N
Lagoon/River Channel: Minimize upstream flood control/maintenance	++	+	+	+	+	0	++	0	$	N
Prohibit river bed mining	+	+	+	+	++	+	+	0	Neg	N

Matrix rating system:

Potential Effect - All Categories

+ +	Significant positive impact
+	Positive impact
0	No significant impact
-	Negative impact
- -	Significant negative impact

Construction Cost Estimates

$	$20,000 or less
$$	$20,000 to $100,000
$$$	$100,000 to $500,000
$$$$	Over $500,000

Table 2. Invasive California non-native plants recommended for removal at the Ventura River Estuary properties. Possible replacement plants and propagule types are given. Plant types are as follows: tree (T); shrub (S); forb (F); grass (G).

Plant Type	Non-native Species	Common Name	California Native Replacement Species	Propagule Type
Southern Coastal Dune				
F	*Carpobrotus edulis*,	Hottentot fig,	*Ambronia maritima*, *Ambronia umbellata*, *Ambrosia chamissonis bipinnatisecta*, *Atriplex leucophylla*, *Calystegia soldanella*, *Camissonia cheiranthifolia suffruticosa*, *Distichlis spicata*, *Haplopappus venetus*, *Lupinus arboreus*, *Cakile edentula* var. *californica*,	Seed, nursery seedlings
F	*Mesembryanthemum crystallinum*,	Common iceplant,		
S/T	*Nicotiana glauca*	Tree tobacco		
Western Floodplain Riparian				
G/S	*Arundo donax*	Giant reed	*Salix* spp., *Juglans hindsii*, *Glycyrrhiza lepidota* var. *glutinosa*, *Persicaria lapathiflora*, *Baccharis plummerae*, *Cordylanthus rigidus* spp. *rigidus*, *Cryptantha muricata* var. *jonesii*, *Holocarpha hermannii*	Seed, nursery seedlings, rooted cutting, pole cutting
T	*Ricinus communis*	Castor bean		
F	*Foeniculum vulgare*	Sweet fennel		
F	*Senecio mikanoides*	German ivy		
G	*Cynodon dactylon*	Bermuda grass		
G	*Cardus pycnocephalus*	Italian thistle		
	Nicotiana glauca	Tree tobacco		

Table 2, continued.

Plant Type	Non-native Species	Common Name	California Native Replacement Species	Propagule Type
Dune Swale				
F	*Cardaria draba*	Hoary cress	*Juncus acutus* var. *sphaerocarpus*, *Salix* spp., *Carex pansa*, *Carex barbarae*, *Carex praegracilis*, *Juncus mexicanus*, *Ericameria ericoides*, *Amblyopappus pusillus*, *Camissonia micrantha*, *Cryptantha clevandii* var. *florosa*, *Lepidium nitidum*, *Plantago bigelovii* ssp. *californica*	Seed, nursery seedling, division, root mass
F	*Tetragonia tetragonoides*	New Zealand spinach		
Lower Estuary				
S/T	*Cortaderia jubata*	Pampas grass	*Potamogeton pectinatus*, *Zannichellia palustris*, *Carex praegracilis*, *Scirpus acutus*, *Juncus mexicanus*, *Distichlis spicata*, *Salix* spp.	Seed, nursery seedling, container plant, root mass, cutting, pole cutting
G	*Tamarix ramosissima*	Salt cedar		
T	*Pennisetum clandestinum*	Kikuyu grass		
G	*Arundo donax*	Giant reed		
G/S				
Main river channel				
T	*Tamarix ramosissima*	Salt cedar	*Salix* spp., *Juglans hindsii*, *Glycyrrhiza lepidota* var. *glutinosa*, *Persicaria lapathiflora*, *Baccharis plummerae*, *Cordylanthus rigidus* spp. *rigidus*, *Cryptantha muricata* var. *jonesii*, *Holocarpha hermannii*	Seed, nursery seedling, container plant, root mass, cutting, pole cutting
G	*Cynodon dactylon*	Bermuda grass		
T	*Spartium junceum*	Spanish broom		
F	*Ludwigia uruguayensis*	Uruguay water primrose		
G/S	*Arundo donax*	Giant reed		
T	*Ricinus communis*	Castor bean		
F	*Foeniculum vulgare*	Sweet fennel		

Table 3. Analysis of public access options for the Ventura River Enhancement Project.

ELEMENT/ SCHEME ANALYSIS MATRIX

The following analysis matrix summarizes the impacts of proposed element alternatives in relationship to eight major categories. The categories are, natural resources, visual resources State Park existing recreation use patterns, City Park existing recreation use patterns, resource access and interpretation, the homeless population, construction cost, and operations and maintenance costs.

For the following rating system is used:

All Categories Except Construction & Maintenance

+ +	Significant positive impact
+	Positive impact
0	No significant impact
-	Negative impact
- -	Significant negative impact

Construction Cost

$	$20,000 or less
$ $	$20,000 to $100,000
$ $ $	$100,000 to $500,000
$ $ $ $	Over $500,000

Operations & Maintenance

+ +	Significant increase in cost
+	Increase in cost
0	No significant impact
-	Decrease in cost
- -	Significant decrease in cost

Plan Element	Natural Resources	Visual Resources	State Park Existing Recreation Uses/Patterns	City Park Existing Recreation Uses/Patterns	Resource Access & Interpretation	Homeless	Construction Cost	Operations & Maintenance Cost
Recommended Alternative								
Interpretive Center with outdoor classroom	+ +	0	+ +	+ +	+ +	0	$ $ $ $	+ +
Riparian Trail	+ +	0	+ +	+ +	+ +	0	$ $ $	+
Viewing station at Second Mouth	+ +	0	+ +	+ +	+ +	0	$	+
Viewing platform on Riparian Trail (handicap accessible)	+ +	0	+ +	+ +	+ +	0	$ $	+
Boardwalk to beach area	+ +	0	+ +	+ +	+ +	0	$ $	+

Plan Element	Natural Resources	Visual Resources	State Park Existing Recreation Uses/Patterns	City Park Existing Recreation Uses/Patterns	Resource Access & Interpretation	Homeless	Construction Cost	Operations & Maintenance Cost
Dune Trail with signage and barrier	+ +	0	+ +	+ +	+ +	0	$ $	+
Seaside Wilderness Park Trail with signage	0	0	+ +	+ +	+ +	0	$	+
Connection to Riparian Trail across railroad tracks	0	0	+ +	+ +	+ +	0	$	+
Pedestrian bridge crossing at river	0	0	+ +	+ +	+ +	0	$ $ $ $	
Interpretive kiosk with attendant at river mouth	+ +	0	+ +	+ +	+ +	0	$	+ +
Interpretive kiosk in Main Street parking lot	+	0	+	+	+	0	$	+
Dumpsters/portable toilets at Main Street parking lot	+ +	0	0	0	0	+	$	+
One-entity management	+ +	+ +	+ +	+ +	+ +	+	N/A	- -
Secondary Alternative								
Portable Interpretive Center at river mouth	+ +	0	+	+	+ +	0	$ $ $	+
Unpaved Riparian Trail	+ +	0	0	0	-	0	$	0
No viewing station at Second Mouth	0	0	0	0	-	0	N/A	0
Viewing platform at Riparian Trail not handicap accessible	+ +	0	0	0	-	0	$ $	+
No boardwalk to beach area	0	0	0	0	0	0	$	+

Plan Element	Natural Resources	Visual Resources	State Park Existing Recreation Uses/Patterns	City Park Existing Recreation Uses/Patterns	Resource Access & Interpretation	Homeless	Construction Cost	Operations & Maintenance Cost
Dune Trail with boardwalk, signage and barrier	+ +	0	0	0	+ +	0	$	+
No Seaside Wilderness Park Trail with signage	+ +	0	0	0	- -	0	$	+
No connection to Riparian Trail across railroad tracks	+ +	0	0	-	- -	0	N/A	+
Bikeway undercrossing at railroad bridge	+ +	+	+	+	- -	0	$ $ $	0
Fence barrier on west side of bridge	+ +	-	-	-	-	0	$	+
Unattended interpretive kiosk at river mouth	+ +	0	0	+	+ +	0	$	+
Interpretive kiosk at Main Street parking lot	+	0	0	+	+ +	0	$	+
Alternative camp site for homeless	+ +	+ +	+ +	+ +	+ +	+ +	$ $ $ $	+ +
Committee management	+	0	0	0	0	0	N/A	-
Tertiary Alternative								
No outdoor classroom	0	0	0	0	- -	0	N/A	0
Undeveloped Riparian trail	-	0	0	0	-	0	N/A	0
No viewing station at Second Mouth	0	0	0	0	- -	0	N/A	0
No viewing platform at Riparian Trail	-	0	0	0	- -	0	N/A	0

Plan Element	Natural Resources	Visual Resources	State Park Existing Recreation Uses/Patterns	City Park Existing Recreation Uses/Patterns	Resource Access & Interpretation	Homeless	Construction Cost	Operations & Maintenance Cost
No boardwalk to beach area	-	0	0	0	0	0	N/A	0
No Dune Trail	+ +	0	0	0	- -	0	$	+
No Seaside Wilderness Park Trail with signage	+ +	0	0	-	- -	0	N/A	+
No connection to Riparian Trail across railroad tracks	+ +	0	0	-	- -	0	N/A	0
No pedestrian bridge crossing at river	+ +	+	+	-	- -	0	$	+
No fence barrier on west side of bridge	-	+	+	+	+	0	N/A	0
Barrier fence at river mouth	+	- -	- -	-	+ +	0	$	+
No Interpretive kiosk in Main Street parking lot	-	0	0	0	+ +	0	N/A	0
Homeless campsite at Emma Wood State Park	+ +	- -	- -	-	- -	+ +	$ $ $ $	+ +
Separate management responsiblity	-	0	0	0	-	0	N/A	0

REFERENCES

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