

San Luis Obispo County Proposition 1E Proposal Economic Analysis – Water Quality and Other Benefits

Attachment 9 describes the value of the water quality and other benefits that will be delivered by the Zone 1/1A Waterway Management Program (WMP), Alternative 3a Project. This Attachment begins with a brief summary of the current state of the water quality in the Alternative 3a Project area. Following that, the project is analyzed for water quality and other benefits.

Project Area Water Quality Background

Arroyo Grande Creek is a 157 square mile coastal watershed located in west-central San Luis Obispo County. The project area is located along the lower portion of mainstem Arroyo Grande and Los Berros Creeks within San Luis Obispo County. The project area is a linear corridor with two segments (1) beginning on Arroyo Grande Creek 0.14 mile upstream of the confluence of Los Berros Creek and continuing downstream to the upper edge of the Arroyo Grande Creek lagoon at the Pacific Ocean, and (2) beginning at the Century Lane Bridge on Los Berros Creek and continuing downstream to the confluence with Arroyo Grande Creek (Figure 9-1).

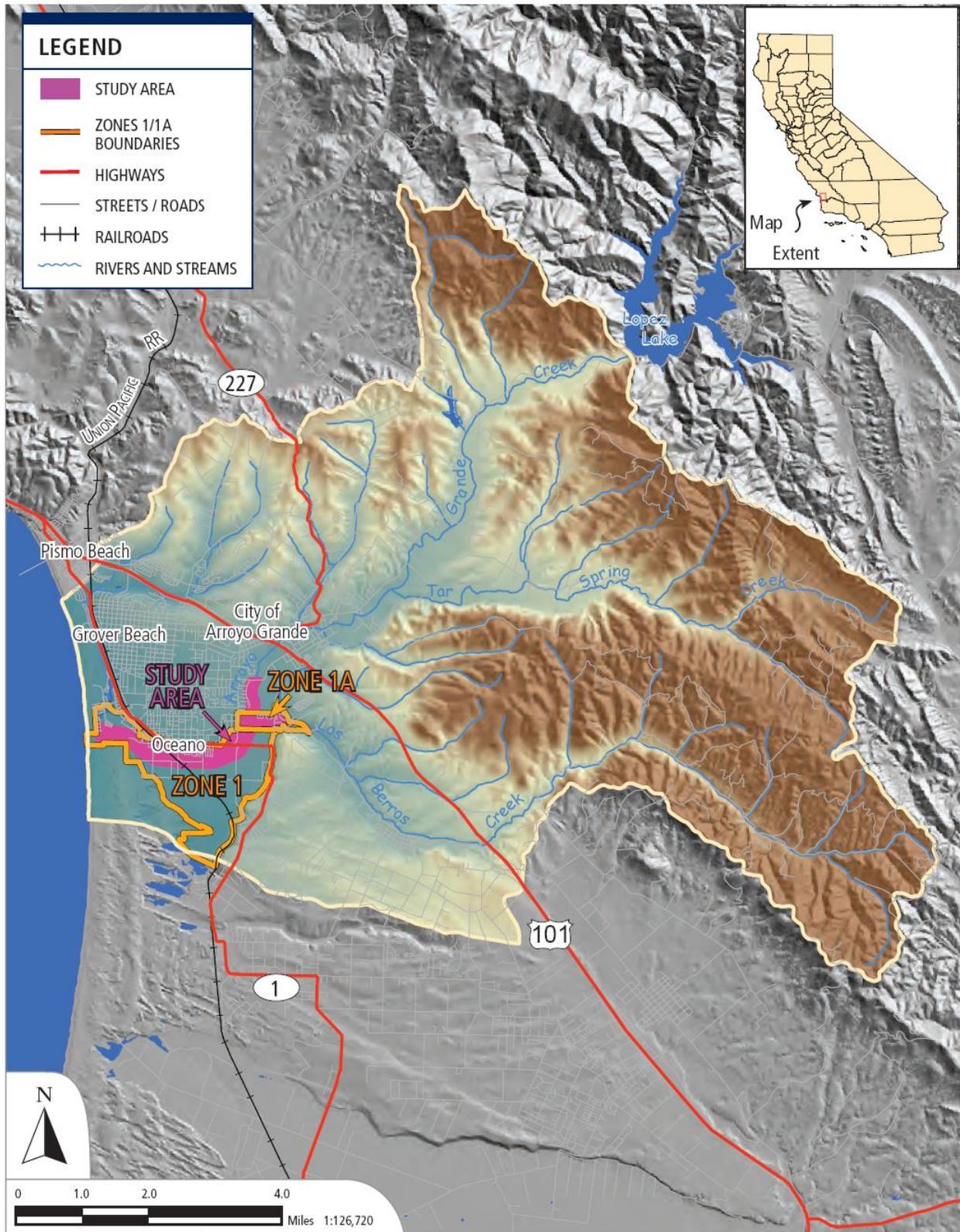
The total project length is approximately 3.5 miles. The project area ends just upstream of a euryhaline coastal lagoon that occurs at the mouth of Arroyo Grande Creek. Portions of the lagoon lie within the Pismo Dunes State Reserve and the lagoon bisects Pismo State Beach. Similar to other coastal lagoons in central California, the mouth of the creek is seasonally obstructed by a sand bar that forms in spring and persists until winter rains are sufficient to hydraulically force the sand bar to open. During drought or periods of prolonged dry weather the sand bar may not open at all. When the sand bar is in place depths in the lagoon can increase causing the lagoon to backwater a significant distance up into the flood control channel.

A key feature in the existing landscape of Arroyo Grande is Lopez Dam. Lopez Dam is located at a point in the watershed where there is a transition from confined mountain valley to an unconfined coastal plain. Downstream of Lopez Dam, the channel is much flatter, the valley much wider and historic floodplain deposits occur across the entire valley bottom. This area represents a depositional zone within the watershed where large quantities of water and sediment transported from the upper watershed historically spread across the valley floor, creating the large alluvial valley that exists today. In the lower portions of the mainstem, near the Community of Oceano, the floodplain deposits are extensive. Combined with the potential for a sand berm to form at the mouth, high tides and storm surges during peak flow events, and the constricting presence of the sand dunes, this portion of the system can be classified as deltaic in nature.

Environmental concerns and restrictions for the lower Arroyo Grande Creek increased following the listing of the California red-legged frog (*Rana aurora draytonii*), in 1996, and steelhead (*Oncorhynchus mykiss*), in 1997. Protection of critical habitat for these two species meant that past maintenance activities of the lower Arroyo Grande Creek, required under the 1959 agreement with the NRCS and RCD, were no longer feasible. Prior to the termination of the 1959 maintenance agreement, the District, RCD, and NRCS were responsible for operation and maintenance of the leveed lower three miles of Arroyo Grande Creek. As concerns for environmental protection have increased, the District has been limited in its ability to conduct periodic maintenance to remove sediment and reduce flood risks. Consequently, the sediment has been allowed to accumulate, negatively impacting both water quality and channel capacity.

The lack of channel flushing flows has resulted in a narrow low-flow channel that lacks complexity. In addition, much of the bed of the channel consists primarily of silt that likely limits spawning. The presence of excessive fine sediment loads in streams has been shown to limit macroinvertebrate production, reduce the amount of cover habitat available to juvenile salmonids, and limit successful spawning.

Figure 9-1: Alternative 3a Project Area



Project Approach

The Alternative 3a Project is the first phase of the comprehensive Waterway Management Program (WMP) developed by the San Luis Obispo Flood Control and Water Conservation District Zone 1/1A, in conjunction with the San Luis Coastal RCD. The project will provide increased flood conveyance capacity in the lower Arroyo Grande and Los Berros Creek channels while simultaneously protecting and enhancing the riparian corridor within the channel. Deferred maintenance due to increased sedimentation, stringent environmental protections, levee deterioration, escalating maintenance costs, and lack of funding have reduced the channel capacity such that levee overtopping can be expected with less than a 5-year storm event. When the Arroyo Grande levee system was breached on the south side, during a high rain event in 2001, hundreds of acres of farmland and several residences were flooded, resulting in damage claims to the County flood control district totaling over \$1,000,000 dollars. Impacts from the flooding persisted beyond the winter season as many of the areas with clay soils located in the southern portion of the valley remained saturated for many months.

Arroyo Grande Creek water quality is impacted by these flood flows. Frequent flooding inundates highly productive farmland and return waters from the flooded fields adds sediment and agricultural contaminants to the downstream flows in Arroyo Grande Creek.

Project Synergies

Flood Management Program Goals and Objectives

The goal of the San Luis Region IRWMP Flood Management Program is to develop, fund, and implement an integrated, watershed approach to flood management through a collaborative and community supported process without unfairly burdening communities, neighborhoods or individuals.

The Alternative 3a Project is a comprehensive set of actions that includes immediate-term, near-term and long-term measures to restore the capacity of the leveed lower three miles of the Arroyo Grande Creek flood channel to increase flood protection to homes, prime agricultural lands, and critical urban infrastructure in the lower Arroyo Grande Creek watershed. The project also addresses a high priority objective for the region – providing increased flood protection for the disadvantaged community of Oceano and the highly productive agricultural region of Cienega Valley.

The ultimate goal of the Flood Control Zone 1/1A WMP is to provide flood protection from the 20-year flood event. The Alternative 3a Project of the WMP will provide flood protection from the 10-year event while also capitalizing on opportunities for enhancing stream and riparian habitat. Selection of the Alternative 3a Project instead of the full scale WMP recommendation was made to address the goal of implementing community supported projects that will not unfairly or unreasonably burden the community through increased assessments. Phased implementation of the WMP allows the assessments to be maintained at an affordable level for the Zone 1/1A landowners. At the current level of assessments, project funding would be available by 2037. Award of this grant funding would advance the completion date of this project approximately 24 years, from 2037 to 2013.

The Flood Control Zone 1/1A WMP and the Alternative 3a Project supports the following IRWMP Flood Management Program objectives:

- Distinguish the root cause of flooding problems stemming from new development, existing development, and mandatory regulation.
- Integrate ecosystem enhancement, drainage control, and natural recharge into development projects.
- Develop financial programs for drainage and flood control projects.
- Evaluate and minimize the risk of dam and levee failures.
- Develop and implement public education, outreach, and advocacy.

The Alternative 3a Project is also related to two other integrated programs in the San Luis Obispo Region IRWMP - the Ecosystem Preservation and Enhancement Program and the Water Quality Program.

Ecosystem Preservation and Enhancement Program Synergies

The goal of the Ecosystem Preservation and Enhancement Program is to protect, enhance and restore the region's natural resources including open spaces; fish, wildlife and migratory bird habitat; special status and native plants; wetlands; estuarine, marine, and coastal ecosystems; streams, lakes, and reservoirs; forests; and agricultural lands without unfairly burdening communities, neighborhoods or individuals.

The Alternative 3a Project will improve the geomorphic function by removing accumulated sediment, establishing a primary low-flow channel, and creating secondary overflow channels to improve flood conveyance and sediment transport. Maintenance of a primary low-flow channel, enforced by the presence of a stable riparian corridor, will improve sediment transport conditions throughout the flood control reach which will reduce the need for future maintenance/dredging. Improving the geomorphic condition, minimizing maintenance requirements, and improving water quality of the environmentally sensitive Arroyo Grande Creek supports the following environmental objectives:

- Purchase and conserve through easements, preserve, enhance, and restore land in ecologically sensitive ecosystems.
- Manage public lands access to encourage public involvement and stewardship.
- Manage stream flows to fish bearing streams, support a region-wide fish passage barrier prevention, circumvention and removal program, and implement fish friendly stream and river corridor restoration projects.
- Reduce the effects of invasive plant species, manage public properties to re-establish rare and special status native plant populations, and promote native drought tolerant plantings in municipal and residential landscaping.

Water Quality Synergies

The goal of the Water Quality Program is to protect and improve water quality for beneficial uses consistent with regional interests and the Basin Plan in cooperation with local and state agencies and regional stakeholders without unfairly burdening communities, neighborhoods or individuals. The Alternative 3a Project supports the following water quality objectives through the removal of sediment and improved sediment transport conditions in the channel:

- Protect and improve source water quality.
- Support the development and implementation of TMDLs.
- Implement NPDES Phase II Storm Water Management Programs.
- Implement the California NPS Plan and the RWQCB Conditional Agricultural Waiver Program for irrigated agriculture.

The Alternative 3a Project included in this proposal meets all of goals and objectives as described above. The project, if funded, will be the first phase of the overall WMP and includes raising the levees to protect the area from the 10 year event. Ultimately, full implementation of the WMP will require increasing the levee height to protect the area from a 20 year event and raising the UPRR Bridge above the 20 year water surface elevation to increase the flood capacity of the channel. The Alternative 3a Project delivers an equivalent degree of benefit towards the environmental and water quality goals and objectives as the overall WMP by completing the full scale sediment and vegetation management measures. However, the Alternative 3a Project will be designed to protect against the 10 year event as compared to the 20 year level of protection from the overall WMP. Award of this grant would advance the completion date of the Alternative 3a project approximately 24 years, from 2037 to 2013. If the grant is awarded, the projected completion date of the second and final phase of the WMP (Alternative 3c Project) would be advanced by approximately 20 years, from 2076 to 2056.

Expected Water Quality Benefits

Estimates of “Without Project” Baseline

Without the Alternative 3a project, the existing flood flow capacity of the Arroyo Grande Creek channel will not be increased. As a result, overtopping of the existing levees would be expected with a 4.6-year storm event causing flooding of agricultural lands south of the levee channel. (North levee elevations are slightly higher, by design, to protect residential areas and direct overtopping to the south.) The Alternatives Study estimated that approximately 700 acres of cropland in Cienega Valley would be inundated with a levee overtopping during a 5-year storm event (Alternatives Study, 2006, pg 29). Frequent flooding would inundate highly productive farmland and return waters from the flooded fields would add sediment and agricultural contaminants such as pesticides and fertilizers to the downstream flows in Arroyo Grande Creek which then enter the Pacific Ocean. We are unable to quantify the amount of agricultural contaminants and sediment that would be introduced into the downstream waters in the no project scenario because there is no baseline of water quality from which to compare. However, the Central Coast Regional Water Quality Control Board has documented in their Central Coast Agricultural Surface Water Assessment Summary, the following :

“The Central Coast Region includes a diverse landscape of agricultural crops, orchards, and vineyards, rapidly expanding urban areas, and many miles of paved roadways. Chemicals applied to the land (including nutrients, pathogens, metals, pesticides, herbicides, petroleum products and others) make their way into drainages, creeks and rivers, and ultimately the ocean. Pesticides and nutrients that are applied to the land are causing serious damage to our Central Coast water resources. Not all pesticide and nutrient pollution originates from agricultural land. However, research projects and monitoring programs have shown high levels of chemicals leaving agricultural land and entering the waterways of our Region. Our Region’s Central Coast Ambient Monitoring Program (CCAMP) data provided evidence of this problem during development of the existing and first Regulatory Order for irrigated agricultural discharges in 2004, the Conditional Waiver of Waste Discharge Requirements for Discharges from Irrigated Lands (Order). The Order specified monitoring requirements that led to development of the Cooperative Monitoring Program for Agriculture (CMP).” (http://www.ccamp.net/ag/index.php/Main_Page)

Without the project, the levees could overtop every 4.6 years, which would not only impact the agricultural lands but affect downstream water quality and the critical habitat of steelhead and tidewater goby which are found in the area of the creek where it meets the ocean approximately ¼ of mile downstream from the proposed project area.

“With Project” Baseline

The Alternative 3a Project will increase capacity of the existing levees along Arroyo Grande and Los Berros Creeks from 2500 cubic feet per second (4.6 yr event) to 7500 cfs (16.6 yr event). This much needed first phase of work will provide increased flood protection for the highly productive agricultural lands of the Cienega Valley as well as the DAC of Oceano.

With this project, the channel capacity would be tripled and the probability for levee overtopping and flooding of farm fields would be reduced 300% each year. The reduction in flooding would result in reduced runoff from farmland which would provide a secondary benefit of protecting surface water from increased sediment load and agricultural contaminants which would protect critical endangered species habitat downstream. While values have not been assigned for avoiding these increases, the reduction in farm field runoff correlates to a reduction in potential contamination and sedimentation of downstream waters.

Furthermore, the project will raise and strengthen the existing levees, which will mitigate the existing potential for water quality impacts due to erosion and sedimentation. The levee construction will incorporate permanent best management practices to control erosion and sedimentation that would occur during a levee overtopping event, anticipated to occur when storm flows in the channel exceed the 16.6 year flood capacity (or 10 year flood capacity with 2 feet of freeboard). The project will not only prevent water quality impacts due to erosion and sedimentation by increasing the flood capacity to contain up to the 16.6 year storm event (no freeboard, or 10 year storm with 2

feet of freeboard), but will also mitigate water quality impacts expected during a levee overtop for all other larger storms (greater than the 16.6 year event).

Timing and Distribution of Benefits and Identification of Beneficiaries

This project provides local and regional benefits by reducing the potential for sediment and other agricultural contaminants to reach downstream surface waters such as the Pacific Ocean. The ocean and beach areas downstream are a lucrative tourism area for the DAC of Oceano which would be adversely affected by sedimentation and contamination occurring as a result of overtopping causing the potential closure of beach areas.

Benefits Timeline

Award of this grant would advance the completion date of the proposed project approximately 24 years, from 2037, to 2013 which is the expected date of completion of construction. At that time, the water quality benefits associated the increase in flood conveyance capacity from a 4.6 year to 16.6 yr event would be realized by way of the reduced potential for flood inundation of farmland in the Cienega Valley while simultaneously improving the channels riparian habitat corridor. The benefits associated with the enhanced riparian corridor are described below under “other “benefits. Ultimately, with the final phase of the Waterway Management Program, a second phase of levee raising will provide the 20 year flood protection reducing even further the chance of farmland inundation and subsequent water quality degradation of downstream waters. The Alternative 3a project is the necessary first step and the foundation for the completion of all projects in the Zone 1/1A Waterway Management Program, providing immediate benefits through increased capacity of the channel and reduction of potential contamination and sedimentation of downstream waters.

Certainty of the Benefits

The certainty of the water quality benefits is based on reasonable assumptions and on previous experience during the levee breach of 2001. The assumption that runoff from agricultural lands contains contaminants such as fertilizers, pesticides, and sediment is well documented and monitored by state agencies such as the local regional water quality control board. The assumption that the quantity of runoff and contaminants present in an overtopping event is significant enough to cause downstream effects is less certain. No measurable data was taken at the time of the breach in 2001, therefore the quantity of benefit to water quality is uncertain but with certainty we can state that there will be benefits to water quality by the reduced risk of overtopping and reduction in potential contamination and sedimentation of downstream waters.

Adverse Effects

The project is not anticipated to produce any adverse effects. Any impacts resulting from construction will be fully mitigated through the permitting process.

Expected Other Benefits

Ecosystem Restoration

Estimates of “Without Project” Baseline

Without the Alternative 3a project, current efforts to maintain the vegetation in the creek channel are limited to annual limbing up of willows and removal of invasives all within the constraints of a limited budget. Arroyo Grande Creek channel is home to three endangered species; Steelhead, California red-legged frog and Tidewater Goby. Limiting factors for Arroyo Grande Creek Channel include increasing sedimentation, decreasing spawning gravel quality and quantity, fish passage barriers, decreased water quantity, and increased water temperature due to a lack of canopy (Arroyo Grande Creek Watershed Management Plan, Central Coast Salmon Enhancement, March 2005, page 2). Without the project the habitat will remain as is without enhancement. Sediment will continue to build up

and be deposited in various areas which can then alter the location of the low flow channel and therefore the location of the riparian areas which provide shade and cover. Due to funding restrictions only a limited portion of the channel is maintained each year which essentially just keeps pace with the each year's new vigorous growth. Under the current vegetation management, the riparian corridor has not been stabilized by a continuous canopy over the low flow channel and over flow channels and species diversity is limited. Willows are the primary tree species and have become top heavy from only being able to limb them up, this in turn results in many trees falling down during storms with high winds. As trees fall down canopy cover over the low flow channel is reduced. Without the project the potential symbiotic relationship between channel capacity and riparian habitat is not effectively utilized.

Estimates of “With Project” Baseline

The Alternative 3a Project is designed to maintain balance between flood protection and protection of natural resources. The goal of the vegetation and sediment management activities is to increase flood capacity throughout the project reach while at the same time improving in stream aquatic habitat and reducing the need for sediment maintenance in the future. The goal of the Alternative 3a levee raise is to increase channel capacity to contain flood flows from a 16.6 year storm event.

The proposed vegetation management is designed to maintain a stable riparian buffer to create a continuous riparian canopy through the project area that provides benefit to terrestrial and aquatic species that rely on cover habitat, cool water temperatures and other functions provided by a continuous and diverse riparian corridor. Depending upon the maturity of the trees, the upper portion of the tree canopy would likely extend well beyond the buffer width. The buffer would also act to maintain a primary low-flow channel that has developed over the last several years by providing root strength along the low flow channel margins. To improve riparian habitat through the project area, existing gaps in the riparian buffer would be re-vegetated with native riparian species including cottonwood, sycamore, and willow.

The proposed sediment management portion of the project will enhance geomorphic function by initial removal of accumulated sediment to create secondary channels and integration of habitat enhancement structures consisting of large natural wood logs. In natural systems, the primary channel contains low flows, whereas secondary channels become activated during higher flows that, on average, occur once a year (Figure 10 from WMP).

The Arroyo Grande Creek flood control channel currently lacks the secondary channels that are found in more natural, low gradient stream environments. Based on the current configuration of the primary (low flow) channel, secondary channels will crisscross the primary channel as the primary channel meanders between the levee side slopes (sheet C8 of 30% design plans).

During high flow events, the intersection of the primary and secondary channels are expected to be areas of complex flow conditions that will create localized eddies, backwaters, and scour. To take advantage of these high energy areas and encourage development of complex cover habitat for steelhead and red-legged frog, two types of large woody structures will be constructed at these locations. One type of large wood structure will be placed at the downstream end of each secondary channel as it conflues with the primary channel. The structure will provide protection from any headcutting into the secondary channel and therefore enforce the location of the primary channel. The structure has also been designed to encourage pool scour at the confluence and mimic an undercut bank (similar to lunger structures traditionally used to enhance fish habitat). The Arroyo Grande Creek is recognized as an anadromous, natural production steelhead stream. The relatively good water quality in the watershed should be protected, as it is less expensive and more efficient to protect a water body's health than to remediate it once it has been impaired (Arroyo Grande Creek Watershed Management Plan, Central Coast Salmon Enhancement, March 2005, page 2). Because pool habitat and escape cover is lacking through the flood control reach, improvements to these physical habitat characteristics are expected to greatly improve aquatic habitat. In addition, these structures will provide escape cover for adults migrating through the reach to preferred spawning and rearing habitat areas that occur upstream of the flood control reach.

The second type of large wood structure would protect the head of bar that would exist at the downstream side of the confluence. This structure would also enforce maintenance of the primary and secondary channel locations and create a hard point that would encourage turbulence and creation of a pool at the confluence of the channels. Although both types of structures are designed to meet different habitat and channel stability objectives, they will

promote pool scour, encourage variability in substrate and flow field conditions, and provide deep pools and cover habitat for steelhead and red-legged frog.

The combined vegetation and sediment management will “set” the flood control channel to an initial condition which mimics a natural system consisting of a primary low-flow channel supported by the presence of a stable riparian corridor. The completed project will enhance sediment transport and there by reduce the need for future sediment removal projects providing continued ecosystem services to the existing sensitive species habitat found in both the flood control channel and upstream of it.

Distribution of Benefits and Identification of Beneficiaries

Although qualitative in nature, the associated ecosystem protection and enhancement benefits of this project are significant and will provide local, regional and statewide benefits through the publics enjoyment of a healthy diverse creek environment and protection of three state endangered species; Steelhead , California red-legged frog and Tidewater Goby.