

Site SL-7-1R

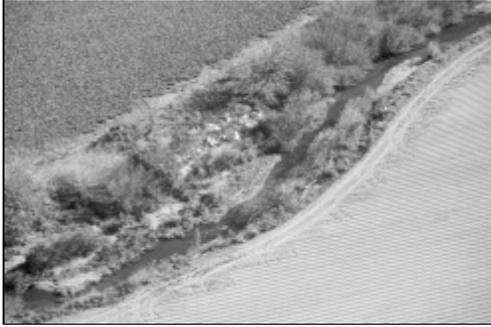


Figure 6. Photograph of Project Site SL-7-1R.

Problems: Problems associated with this site include degraded riparian vegetation, bank failure, erosion and subsequent sedimentation, and elevated water temperatures.

This site lies immediately downstream from the City of San Luis Obispo and receives high velocity flows during storm events. Degraded

riparian vegetation makes the banks and adjacent farmland vulnerable to erosion and flood scour. Soil eroded from the farm field reenters the creek just downstream and contributes to sedimentation. Resulting sedimentation degrades fisheries habitat by covering channel bed gravels used by anadromous fish for spawning.

Elevated water temperature is another problem on this site. Throughout the watershed, areas with degraded riparian vegetation leave the stream vulnerable to solar heating. The temperature remains elevated through the project site due to the lack of overhead canopy and shade. High water temperatures increase mortality rates of fish eggs and make it difficult for adult fish to extract dissolved oxygen from the water.

Project Description: This project will stabilize the outer bend of the Creek, possibly with the installation of a vegetation based stabilizing structure. This would decrease erosion and the amount of sediment entering the creek. The project will also include the addition of canopy cover trees and a riparian buffer strip composed of low growing understory species. The trees will shade the water and contribute to cooler water temperatures and the buffer strip will reduce the velocity of floodwaters and reduce soil erosion.

Some additional hydrologic analysis would be necessary to determine the bank stabilization methods. Where stabilization structures are used, creation of additional deep pool habitat through the use of structures such as logs and boulders that cause scouring of the channel bottom will be investigated. This reach of San Luis Obispo Creek is deficient in this type of habitat. Planning of fish habitat devices will be preceded by an investigation of water quality to determine the value of additional pool habitat at this location.

Expected Project Benefits: This site receives a great deal of water during storm events, and is likely to continue to flood during larger storms due to limited channel capacity. However, establishment of a riparian buffer of large trees and understory species will serve to decrease the velocity of flood waters running over the tilled agricultural land. This will result in more sediment deposition on the field and less sedimentation of the creek. The large canopy trees will provide additional bank stability and shade to cool the water. Some grading of the bank will probably be necessary, requiring some loss of farmland

productivity. This project is also immediately upstream of an ongoing restoration project that encompasses ½ mile of riparian revegetation. This project will enhance the downstream work forming an extended reach (1 mile) of restored riparian vegetation.

Estimated Project Cost: \$53,000

Site EF-1-1R



Figure 7. Photograph of project site EF-1-1R.

Problems: Problems on this site include degraded riparian vegetation and alteration of the natural creek channel. The result is an extremely unstable bank and stream channel that regularly causes severe erosion and sedimentation of San Luis Obispo Creek.

Project Description: The project plan is to correct the alignment of the channel and stabilize the banks with native vegetation.

Expected Project Benefits: Project benefits will include a significant reduction in erosion and subsequent sedimentation. The improved riparian corridor will also increase terrestrial riparian habitat and contribute to enhanced water quality.

Estimated Project Cost: \$ 67,000

Exotic Plant Species Removal and Stream Habitat Maintenance Plan

Problems: One of the most serious riparian corridor problems encountered in the San Luis Obispo Creek watershed is the invasion of non-native (exotic) plants. Invasion of exotic plant species reduces the establishment of native riparian vegetation, which provides shade and maintains lower water temperatures for fish and other aquatic animals. Exotic plant species are found throughout the watershed and represent a significant amount of habitat in need of restoration. Another problem includes the accumulation of debris in the stream bed that degrades the stream habitat for fish and other aquatic life and increases the likelihood of flooding.

The March, 1997 Draft Plan identified project concepts that focused on exotic plant removal and other stream habitat maintenance projects. A number of public comments also supported similar projects (Appendix D). However, exotic plant removal and stream habitat maintenance projects require a systematic watershed-wide approach to be effective in the long term. This is because upstream plants will continue to provide seeds and other

regenerating materials to downstream areas if an overall approach to eradication is not pursued.

Project Description: This project will develop a watershed-wide exotic plant species removal and stream habitat maintenance plan for the San Luis Obispo Creek watershed. It will identify exotic species locations for selected species, removal strategies and methods, and approaches to habitat improvement, as well as provide guidelines for future exotic species removal and stream habitat maintenance projects.

Expected Project Benefits: This plan will facilitate implementation of exotic plant species removal and stream habitat maintenance projects that were previously not considered for restoration actions because they were temporary fixes to chronic problems. Emphasis will be on long-term solutions and not one-time improvements.

Estimated Project Cost: \$25,000

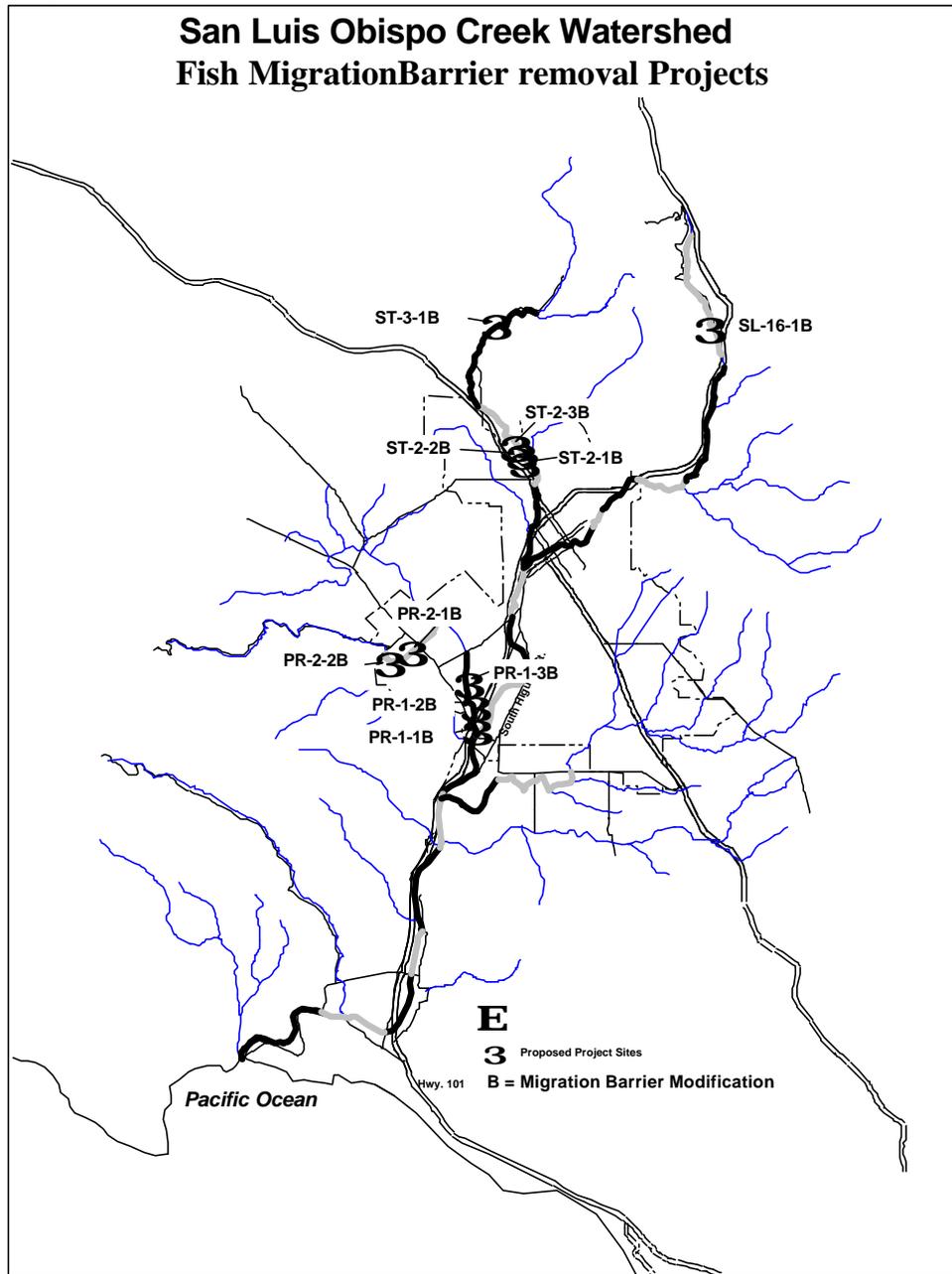
2. Fish Barrier Removal

Barriers to fish passage exist throughout the San Luis Obispo Creek watershed. These impediments include elevation, velocity, and depth barriers. Elevation barriers are those that have high drops or cascades that inhibit fish migration upstream and downstream. Velocity barriers are structures that cause water to move faster than fish can negotiate, thus preventing upstream passage. Depth barriers occur when water “sheets” and becomes too shallow for fish passage. Removing fish barriers benefits fisheries by providing access to areas already characterized as having high quality spawning and rearing habitat.

Each barrier selected for removal has been examined by fisheries experts, including a Hydraulic Engineer, and a Fish Habitat Assistant, both from the California Department of Fish and Game. Decisions on funding were primarily based on benefits relative to costs. Some projects, although possible on an engineering basis, did not justify the expenditure because they were not seen as barriers to significant numbers of migrating fish. In one case, barrier removal was required under another mitigation settlement and was dropped from funding from this restoration plan. Top priority was given to barriers that inhibit migration of adult and juvenile steelhead trout to and from extended areas of high quality habitat. Finally, consideration was given to the level of landowner cooperation, whether the project may qualify for completion using other fund sources, and site accessibility.

Ten barriers approved for funding are shown on Figure 8.

Figure 8. Map of Fish Migration Barrier Removal Project Sites.



A sequential approach has been adopted in addressing the identified fish barriers. The sequential location of each barrier along a common stream was considered since an individual stream is only as good as the least passable barrier. Also, care will be taken in the final design and construction of the projects to guard against collateral bank erosion or damage to adjacent properties.

Site SL-16-1B, San Luis Obispo Creek at Stagecoach Road



Figure 9. Photograph of San Luis Obispo Creek, Fish Barrier SL-16-1B.

Problem: This is a large concrete culvert that has a drop of approximately 2 feet at the downstream end, creating a velocity barrier at high flows and a sheeting depth barrier at low flow.

Project Description: A series of rock weirs will be constructed in the downstream channel to an elevation that will backwater the culvert.

Expected Project Benefits: Improvement of this velocity barrier will allow migrating adult fish to reach spawning areas in the upper watershed and will provide access to juvenile steelhead rearing habitat. During low-flows this improvement would increase juvenile rearing habitat.

Estimated Project Cost: \$16,500

Site PR-1-1B, Prefumo Creek at Highway 101



Figure 10. Photograph of Prefumo Creek, Fish Barrier PR-1-1B.

Problem: This culvert has a drop of approximately 3 to 4 feet at its outlet and poses an elevation barrier during high flows and a shallow water depth barrier during low flows. In addition, low flows travel under the riprap apron. This barrier inhibits fish access from San Luis Obispo Creek to the entire

Prefumo Creek drainage, that contains valuable trout habitat.

Project Description: A 4-step rock weir fishway will be constructed to step the water level to the bottom of the culvert. A concrete sill across the end of the culvert apron will also be installed.

Expected Project Benefits: This project is the lowest barrier in the Prefumo Creek drainage and modification will improve access to the entire drainage, which contains several miles of moderate to high quality trout habitat. Several other barriers in this system are also approved for funding.

Estimated Project Cost: \$74,500

Site PR-1-2B, Prefumo Creek at Calle Joaquin



Figure 11. Photograph of Prefumo Creek, Fish Barrier PR-1-2B.

Problem: This barrier is a concrete box culvert that has a low flow channel constructed on the bottom through the use of concrete curbs. The culvert has a drop of approximately 3 to 4 feet at its outlet and poses an elevation barrier during high flows and a shallow water depth barrier during low flows.

Project Description: Fish passage improvement gained from the curbs appears to be marginal. Project plans are to construct a 3-step rock weir fishway to raise water to the level of the culvert floor. Adding baffles to the culvert floor could increase the efficiency of passage through the culvert, but would also impact its hydraulic capacity.

Expected Project Benefits: Removal of this migration barrier, along with the Highway 101 barrier, will improve fish access to the entire Prefumo Creek drainage.

Estimated Project Cost: \$18,000

PR-1-3B, Prefumo Creek Agricultural and Sewer Line Crossing



Figure 12. Photograph of Prefumo Creek, Fish Barrier PR-1-3B.

Problem: A 5-foot high grouted rock dam constructed to protect a sewer line poses an elevation barrier to fish passage. Fifty feet downstream is an armored section of the stream bed used as an agricultural equipment crossing.

Project Description: A 5-step rock weir fishway along with minor modifications of the dam to concentrate flow will be constructed. Maintaining the agricultural equipment crossing may also be included by installing a hard surface crossing 1-foot thick by 12-feet wide in the lowest weir.

Expected Project Benefits: Following removal of the downstream barriers, removal of this barrier would facilitate movement of fish from San Luis Obispo Creek up to Laguna Lake and above Los Osos Valley.

Estimated Project Cost: \$55,000