Bliss Family Ranch Fish Passage Restoration Project

Carpinteria, California

PROJECT

Fish Barrier Removal Project
Carpinteria Creek
Carpinteria, CA 93013

CONTACT

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TIMING

Project Began:
August 2008

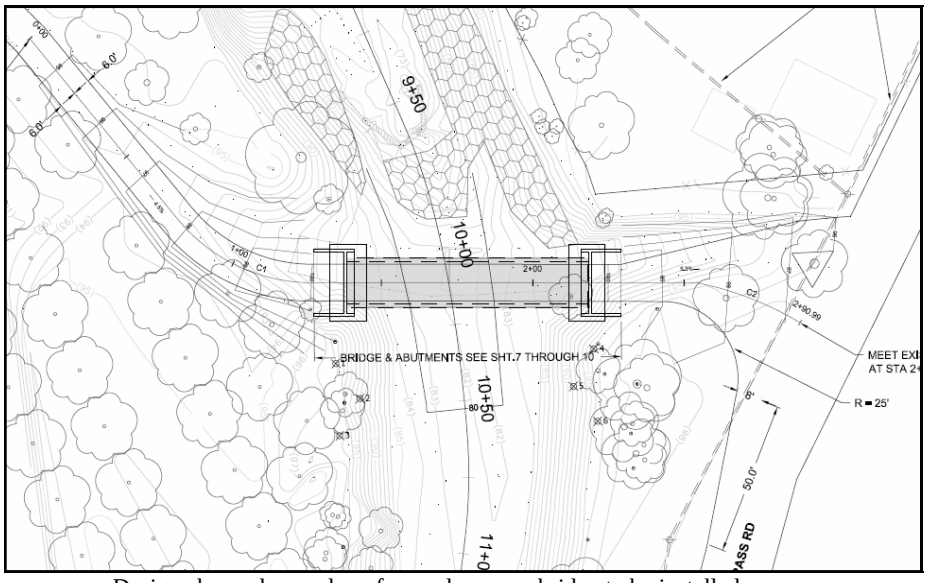
Project Completion Estimate:
December 2008

FUNDING

Natural Resources Conservation Service
CA Dept. of Fish and Game
CA Coastal Conservancy

HIGHLIGHTS

Creek Restoration
Fish Passage Enhancement
Bank Protection
Native Riparian Plantings



Design above shows plan of new clear span bridge to be installed

Photo above shows low flow crossing acting as a barrier to fish migration

Project Summary:

South Coast Habitat Restoration (SCHR) managed the engineering firm who designed the plans for the restoration of Carpinteria Creek, California at the Bliss Family Ranch. Project goals are the removal of the low flow cement crossing from the creek and replacement with a clear spanning bridge in order provide safe passage of the federally endangered steelhead trout as well as year round safe passage across the creek for the property owners. SCHR was able to secure implementation funding for the construction of the project from the Department of Fish and Game, Natural Resources Conservation Service and the California Coastal Conservancy as well as other funding sources.

Project Details:
The proposed project is a fish passage restoration project in Carpinteria Creek at the Bliss property low-flow crossing in Carpinteria, California. The project involves the restoration of approximately 500 lineal feet of Carpinteria Creek. The proposed project includes channel grading, removal of an existing low-flow crossing and the construction of step pool structures, and the installation of a new bridge to replace the concrete low-flow crossing. The purposes of the restoration project are to facilitate the re-establishment of fish movement through the project area and provide year-round, all-weather access to the Bliss site.

Existing Conditions
Site investigations of existing hydrology, hydraulics, and geomorphic conditions were performed to delineate baseline conditions and to test proposed designs.

Channel Planform
It is evident that the planform of the project reach has remained somewhat stable. Generally, the sinuosity of the channel is low within the project reach. There are no significant meander bends that could potentially impact the site in the foreseeable future.

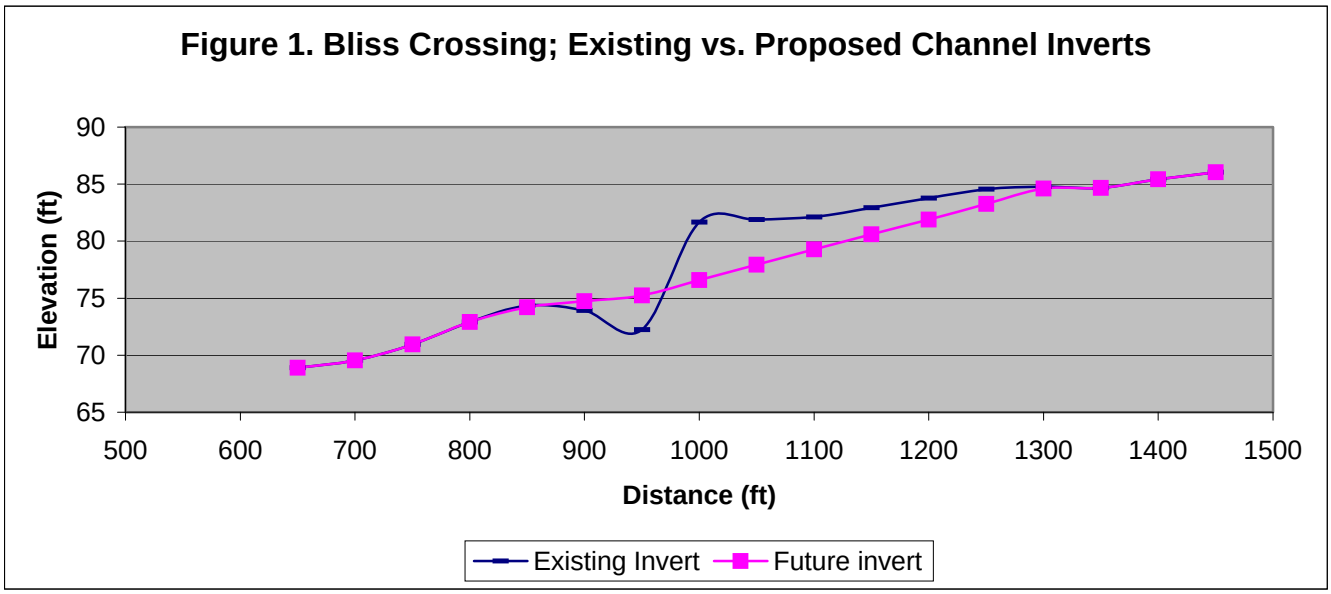
Floodplain Connection
The channel throughout the project reach is incised. There is little connectivity with a floodplain wider than 15 feet until very large events. As described below the channel does not flood onto its large flood plain until at least the 25-year event. Smaller narrow benches exist within the larger channel. These terraces are often 2 to 3 feet above the channel thalweg. The surface sediments on these terraces are generally finer than those found within the active channel and older flood debris was found in vegetation on these benches. Evidence suggests that these benches are inundated somewhat frequently. This coupled with the hydraulic analysis would indicate that these benches are inundated in excess of 2- to 5-year recurrent interval.

The channel immediately upstream of the crossing exhibits a slightly flatter slope and has a significantly wider low flow channel. The channel at stations 1100 to 1450 has average scour line widths in excess of 30 feet and shows shallow depths and little defined low flow channel geometry. This is likely due to the bed controlling nature of the existing concrete crossing.

Appropriate low flow channel geometry appears to indicate that a width between 20 and 25 feet with a depth in the 2 to 3 feet seems appropriate.

Longitudinal Profile
The current longitudinal profile shows that the average channel gradient through the project site is approximately 2 percent. The channel thalweg is inconsistent because of the controlling nature of the concrete crossing; however, an area between stations 725 and 825 exhibits a slope of 4.6 percent. This grade is characterized by a visably coursing of the bedload of the creek. Here the average bedload size in this area is between 12 and 18 inches with intermixed large multi-ton rocks. This reach segment appears to be stable for the present.

The longitudinal profile of the project reach is shown in Figure 1.



Channel Bedload

The channel bedload is generally dominated by small- to medium-size cobbles in the 6 to 12 inch class. Scattered throughout the bed are large boulders up to several feet in diameter. Between the larger coble matrix, medium coarse gravel is present. Fine-grained sediment was not highly present in the channel bottom; however, it was present on the shallow in-stream terraces lying approximately 2 to 3 feet above the channel thalweg. The channel bedload sediments indicate a well-armored channel with a size class that does not readily mobilize. The hydraulic modeling and the channel velocities it predicts show that the significant bedload mobilization may only occur at discharges of 700 cfs or above. This means that given the hydrologic dynamics discussed above, bedload may not be significantly mobilized until a 2 to 5 year event or greater.

Project Characteristics

A new pilot channel that is approximately 20 to 25 feet wide will be constructed through the existing concrete crossing. All concrete revetments will be removed. The existing portions of grouted rip-rap will remain to the greatest extent possible. It was decided to to leave this material in place because removing or reworking this material would be costly and cause greater destabilization of the site. The existing stone revetment will be left in place and buried as needed. This will provide a good deep foundation to the project and help maintain the overall stability of the project. This new channel will be rock lined and willow staked throughout its length. The deepest cut for this channel is expected to be 5 feet. A stack of several boulders may be needed to form the low flow channel banks where channel cuts are greater than 3 feet. This is expected to be to be for around 100 feet of the new channel. Excavated material from the new channel will be used to fill the existing hole below current crossing. These sediments should be screened or sorted so that the larger sized material can be used as lining material for the new channel. Initial calculations estimate about 800 yds of cut material will be generated. Additional large stone material may have to be imported to the site to provide bridge abutment revetment and rock keyway construction.

A series of four deep rock boulders keys will be constructed to ensure that no channel head cutting will migrate above the project site potentially destabilizing the upstream channel. The new bridge abutments will be surrounded by rock revetment. A bed degradation key will be connected to the rock revetment beneath the bridge to ensure channel bed stability at the base of the bridge. Larger material will have to be strategically placed within the new channel such that micro eddies and low velocity areas are created to enhance fish passage.

Extensive grading activities will require vegetative plantings as well as erosion control on the newly created bank slopes. The new floodplain terrace would be planted with appropriate riparian shrub and tree species. Extensive use of willow pole trench planting would be conducted as part of the overall revegetation plan.

Construction Equipment
Construction equipment that will be used to complete the project will include bulldozers, excavators, rubber tired loaders, and off-road dump trucks.

The project management has completed all tasks needed thus far to begin the construction phase in 2008.