Marin County Fish Passage Program

Overview

In 2003, County Public Works received a grant to evaluate and rank County road crossings on salmonid streams for fish passage. In 2005, the results of that study became the foundation for the Countywide Fish Passage and Creek Restoration Program (*Marin Fish Passage Catalog; Taylor and Associates, 2003)*). The goal of the fish passage program at inception was to construct 10-15 high priority projects over ten years. Since then, the program has undertaken twelve fish passage projects countywide; ten in the San Geronimo Creek watershed, one in the Redwood Creek watershed and one in the Novato Creek watershed. Of the twelve projects, eight have been constructed and four are in the design and funding phase. The County has also provided support for several projects in the Towns of San Anselmo, Fairfax and Mill Valley.

Fish Passage Projects Completed to Date

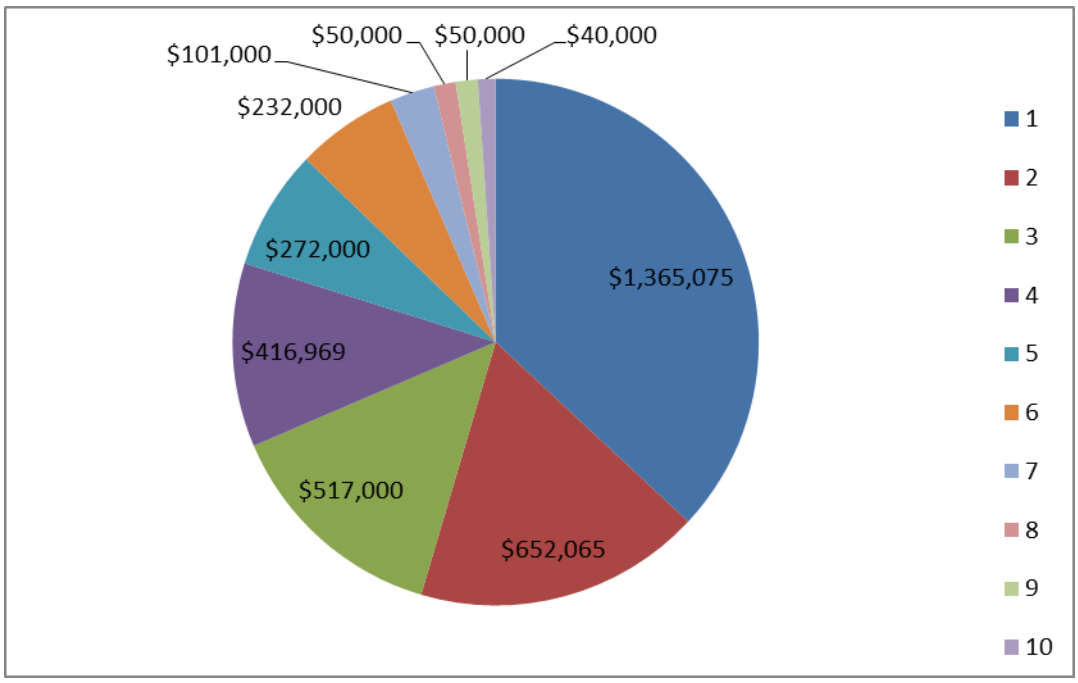
1. Willis Evans Canyon at San Geronimo Valley Dr. (2005)
2. Woodacre Improvement Club (2005)
3. Woodacre Creek at Park St. (2006)
4. Kent Canyon Creek at Muir Woods Rd. (2007)
5. Woodacre Creek at San Geronimo Valley Dr. (2007)
6. Woodacre Creek at Carson Rd. (2008)
7. Vineyard Creek at McClay Rd. (2009)
8. Arroyo Creek at Castro St. (2010)

Fish Passage Projects in Design and Funding Phase

1. San Geronimo #2 at Railroad Ave. (design complete 2011)
2. Larsen Creek at Sir Francis Drake Blvd. (design complete 2013)
3. Montezuma Creek in Forest Knolls Park (design in progress)
4. San Geronimo Valley Dr. bridge sill below Roy's Pools (design to be integrated into Roy's Pools re-design by SGV Golf Course).

Thanks to Our Funders and Partners Who Help Make It Possible

1) Marin County Board of Supervisors
2) California Department of Fish and Wildlife
3) California State Coastal Conservancy
4) NOAA Restoration Center
5) California State Parks and Recreation- Prop 12
6) California State Water Board- Prop 13
7) Coastal Initiative Assistance Program
8) American Rivers
9) Novato Sanitary District
10) Marin Municipal Water District



Total Expenditures for Fish Passage Enhancement (2005-2013)

Grants	**$2,331,034**
County Match	**$1,365,075**
Total Expenditures	**$3,696,109**

Willis Evans Canyon Creek at San Geronimo Valley Dr. (2005)

***Before*:** Prior to construction, the old box culvert created a velocity barrier to coho salmon due to slick concrete inside and a jump barrier due to the scour hole at the outlet.

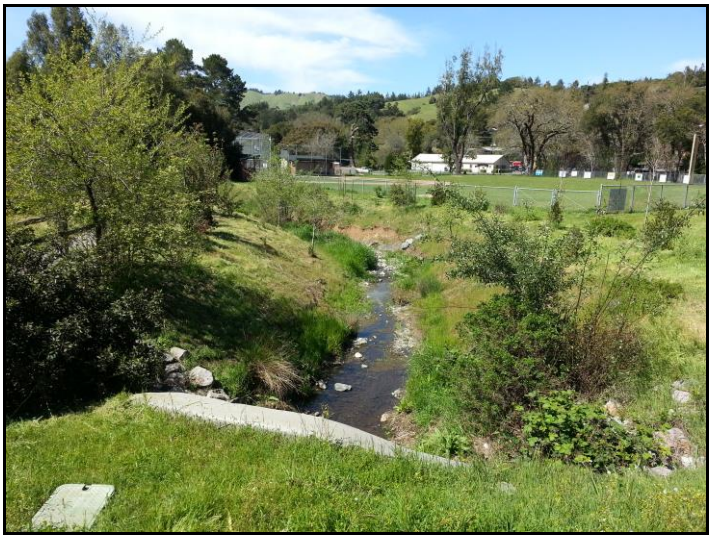
***After*:** Replacement of the crossing with an open-bottomed arch allows the road crossing to literally become "invisible to the creek", providing passage for adult fish swimming upstream to spawn and juveniles migrating downstream during low flows in spring and summer.

East Fork Woodacre Creek at the Woodacre Improvement Club (2005)

Comprehensive restoration of this site included day-lighting approximately 200' of stream channel which ran beneath a tennis court and installation of an arched culvert with an open-bottom channel to eliminate a serious migration barrier. Extensive streambank restoration and revegetation provides cover and shade for salmon. The project opened up 1700' of habitat in upper Woodacre watershed and served as a model for multi-partnership collaboration between the community, the Woodacre Improvement Club, County of Marin and Federal, State, and local funding agencies.

***Before*:** Day-Lighting 200' of creek from beneath a tennis court

***After*:** Replacement of the under-sized, pipe with an open-bottomed arched culvert opened up 1700' of habitat.



Woodacre Creek at Park St. (2006)

Before: High flow velocities through this slick, concrete culvert, combined with rocky rubble dumped at the outlet, created a jump and velocity barrier to salmon.

After: Restoration of this site included replacing the old culvert with an open bottomed arch, installing a roughened channel with embedded weirs to restore channel grade, and revegetating the adjacent stream banks with native plants from the watershed.

Kent Canyon Creek at Muir Woods Road (2007)

Before: This under-sized concrete pipe running under Muir Woods Rd. created a velocity and jump barrier for salmonids moving upstream from Redwood Creek to spawn in Kent Canyon. It was also a low flow barrier for juvenile fish moving downstream during summer low flows.

After: Replacement of the concrete pipe with an open-bottomed arched culvert allows the road crossing to become invisible to the creek; salmon can now pass under Muir Woods Road at all flows, with nothing to impede them.

Woodacre Creek at San Geronimo Valley Drive (2007)

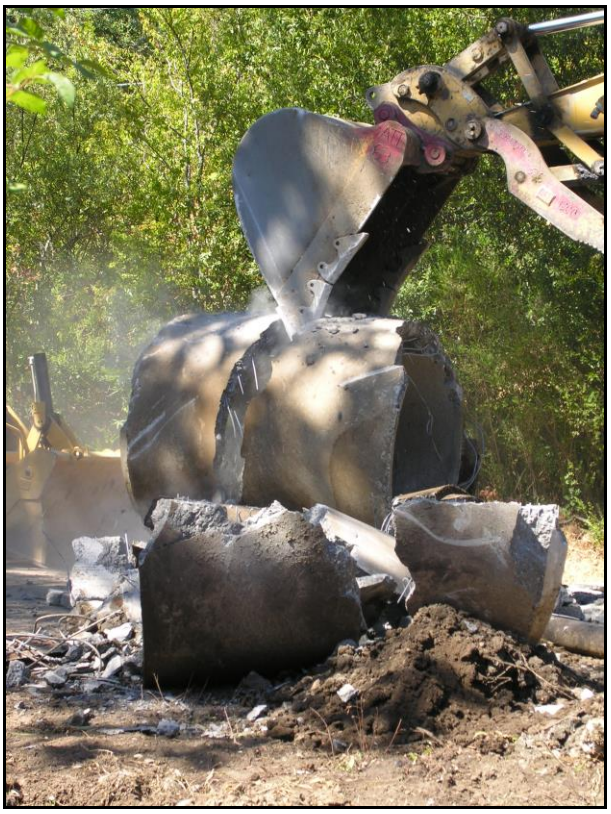
Before: The large box culvert under SG Valley Dr. created a velocity barrier due to the slick concrete bottom and wide flat surface which caused water to come roaring out of the box during spawning in the fall and winter.

After: A roughened rock ramp was installed below the box culvert with a steel sill attached at the outlet to create a backwater, low flow channel for juvenile salmonids. Now during migration periods, fish just swim right through the box- the jump barrier is eliminated.

Salmon also faced a jump barrier getting into the box due to downstream scour caused by the increased velocities and were impeded by low flows in the summer when water sheeted across the concrete creating a low flow barrier to migration.

Woodacre Creek at Carson Road (2008)

Before: Downstream view of the double barreled culvert prior to construction; the under-sized pipes created both velocity and low flow barriers to adult and juvenile coho salmon and steelhead.



After: Replacement of the old pipes with an open-bottomed arched culvert allows salmonids to move freely up and down through the crossing, regardless of time of year and level of stream flows. Completion of the construction of this project removed the last major barrier to coho salmon in the Woodacre Creek watershed.

Vineyard Creek in the Novato Creek Watershed (2008)

Before: This double box culvert on Vineyard Creek had a perched outlet with more than a five foot drop over riprap. It failed to meet fish passage criteria for all species of adult salmonids and all classes of juveniles.

After: Since the boxes were properly sized and in good shape, a retrofit fish passage project included installation of baffles within a large double box culvert to aide steelhead passing upstream during high flow conditions. The downstream channel was stabilized to prevent channel scour and to aid salmon when swimming upstream through the culvert to spawn. The project completed in October 2008.

Arroyo Creek at Castro St. (2010)

Before: The circular corrugated metal pipe presented both a velocity and jump barrier for coho salmon attempting to navigate into the structure in spite of the slick concrete apron and fast flows through the pipe.

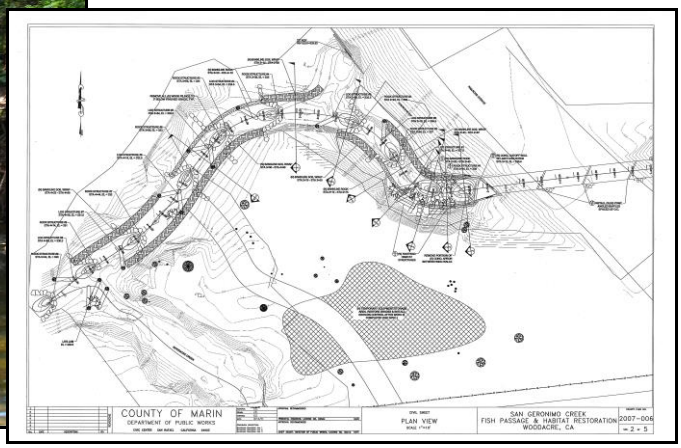
After: The culvert was replaced with an open bottomed arched structure with a natural substrate channel. Removal of the culvert opened up the channel so woody debris now passes unimpeded downstream into the mainstem of San Geronimo Creek.

Once the arched culvert was installed the banks of Arroyo Creek were restored by removing non-native invasive plants and replanting with native riparian plants protected with wire cages from deer.

San Geronimo #2 at Railroad Ave.

Existing Conditions: A large box culvert on the mainstem of San Geronimo Creek, just upstream of the confluence with Woodacre Creek, is both a jump and velocity barrier for coho and steelhead. In 2011, a conceptual design was developed for this project by Marin County Engineering. The County submitted a grant proposal for construction funding to the DFW State Fisheries Restoration Grants Program, however the proposal was denied due to the presence of an instream dam on private property upstream, which blocks salmon migration completely. The County was advised by Fish and Wildlife to not submit this project again for funding until passage is restored over the dam, so for now, this project is on hold.

Barrier Removal Design: The design includes a series of pools in the downstream channel created from rock and logs to create habitat for fish. The stream restoration also works to even out the grade of the creek and eliminate the 5 ft. jump barrier into the box.



The existing box culvert is large enough to pass the 100 year flood, therefore the box will be retrofit with a series of baffles inside to slow water over the slick concrete interior of the box.

Larsen Creek at Sir Francis Drake Blvd.

Existing Conditions: A series of baffles installed by Trout Unlimited in the 1980's attempted to address the jump and velocity barrier created by the slick, steep, perched box culvert running under Sir Francis Drake Blvd. Since then the baffles have degraded and leak, and have the potential to entrain and strand juvenile salmonids migrating downstream during low flows.

Barrier Removal Design- The new design installs a horseshoe shaped, partial flow fishway below the culvert and replaces the interior baffles to improve juvenile salmon migration during all times of year. The design also incorporates the naturally occurring peninsula in the downstream channel which provides high flow refugia in a watershed that is limited by lack of slow water for migrating and over-wintering juvenile coho.

Montezuma Creek in Forest Knolls Park

Existing Conditions: This circular concrete culvert near the confluence of Montezuma Creek with the mainstem of San Geronimo Creek was identified in the passage assessment report (Taylor 2003) as a partial barrier to coho and steelhead. Elimination of the barrier and restoration of the riparian zone in this reach of Montezuma Creek was later identified as a high priority in the San Geronimo Valley Landowner Assistance Program (SGVLAP); as part of the SGV LAP, a conceptual design was developed for the project. The full design for the project and implementation funds to construct it, are being sought through various grant programs for restoration.

Barrier Removal Design: The proposed restoration project includes removal of non-native invasive plants in the riparian zone of Montezuma Creel in an area where it flows through a County Park in downtown Forest Knolls. Marin County Parks will be a partner in the restoration of this site.

San Geronimo Valley Dr. at Roy's Pools (on-going)

Existing Conditions: The County of Marin is poised to partner with the San Geronimo Valley Golf Course on a solution to restore migratory passage through a barrier on San Geronimo Creek at Roy's Pools. The bulk of the project lies upstream in a structure known as Roy's Pools, owned by the San Geronimo Valley Golf Course. The County's owns a very small portion of the project which is a concrete sill located beneath the bridge crossing under San Geronimo Valley Dr.

View from the top of road down to the County section of the project; a bridge sill which lies beneath the San Geronimo Valley Drive impedes passage during summer low flows.

Barrier Removal Design: A fish ladder constructed in 1999 provides fish passage over a historic instream dam and includes a series of weirs large weir pools and a partial flow ladder for juvenile fish. Over time the Roy's Pools project has deteriorated and DFW has given the Golf Course a grant (2014) to redesign the structure including the County's bridge sill downstream.