

Pinole Creek I-80 Fish Passage Project

Fisheries Monitoring Plan



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Introduction

Pinole Creek is located in the San Francisco Bay Area in Contra Costa County and is a tributary to San Pablo Bay (Figure 1). The Pinole Creek Watershed is about 15.3 square miles and has approximately 33 miles of blue line streams. Elevations in the watershed range from sea level to over 1000 feet in elevation. The lower third of Pinole Creek Watershed is urban, the middle third is protected EBMUD watershed lands and most of the upper third is in the Briones Agricultural Preserve. Within this protected upper watershed, Pinole Creek maintains a self-sustaining steelhead/rainbow trout (*Onchorynchus mykiss*) population, which is listed as threatened under the Federal Endangered Species Act.

At most flows, the CalTrans culvert at Highway I-80, approximately 1.5 miles upstream from San Pablo Bay, presents an impassable barrier to steelhead attempting to migrate upstream. The I-80 culvert consists of dual 12' wide by 10' high concrete box culverts with a length of approximately 320 feet and with concrete sills on the upstream and downstream ends. This culvert creates a severe barrier to upstream passage of juvenile and adult steelhead trout. Watershed assessments have demonstrated that the I-80 culverts are the only significant barrier to fish passage into the upper watershed (EBMUD, 2010). Mitigation of this barrier would allow steelhead to access approximately 7 miles of spawning and rearing habitat upstream.

The proposed fish passage project will retrofit the CalTrans I-80 culvert to allow passage of salmonids through the culvert into the upper Pinole Creek watershed. The proposed design would provide depths and velocities at most spawning season flows that will allow for passage of resident rainbow trout and steelhead.

The exclusive goal of the fish passage project is to improve passage for steelhead at the culverts at Highway I-80. Given the flood control function of the associated channel, however, the proposed project has also been designed to avoid increased flooding on adjacent properties and would to maintain a stable channel downstream of the culvert by preventing scour and/or sedimentation. This monitoring plan describes the monitoring methods proposed to document improved passage for steelhead at the I-80 culverts subsequent to the construction of the fish passage improvements.

Fisheries Monitoring Plan

East Bay Municipal Utility District (EBMUD) biologists have monitored resident rainbow trout and steelhead in Pinole Creek for more than two decades. Population monitoring and habitat mapping has clearly documented that quality spawning and rearing habitat for steelhead exists in the upstream portion of Pinole Creek on EBMUD's watershed lands. These data collection

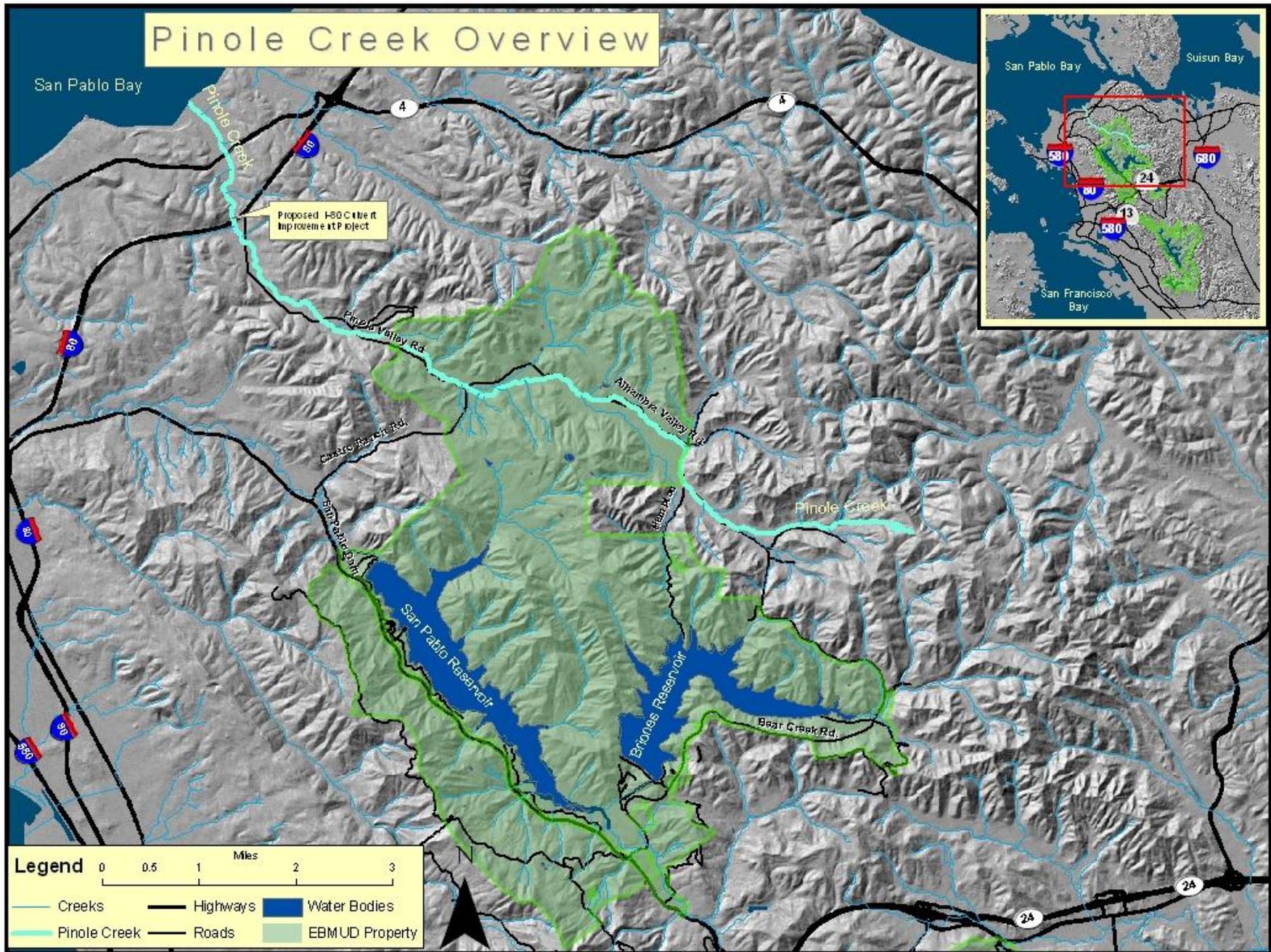


Figure 1. Pinole Creek Overview Map

efforts can inform the design of an appropriate monitoring plan for the I-80 fish passage project. Experience with the specific conditions and constraints in Pinole Creek are crucial to the planning of a successful monitoring project.

EBMUD biologists have periodically sampled rainbow trout/steelhead populations using backpack electrofishing units since the 1980's. Annual population monitoring began in 2008 when EBMUD implemented the EBMUD Low Effect East Bay Habitat Conservation Plan (HCP) (EBMUD, 2008). Since that time, EBMUD has conducted annual electrofishing surveys, hourly creek temperature monitoring, annual salmonid spawning surveys and creek habitat mapping in the Pinole Creek watershed (EBMUD, 2009). This monitoring has provided a significant amount of information on Pinole Creek fish populations and has revealed the limitations and effectiveness of different fisheries sampling techniques for this particular creek system.

Electrofishing surveys have been a successful method for monitoring fish populations in Pinole Creek. These surveys have provided information on species distribution, general population numbers and reproductive success. EBMUD has committed to continue this type of monitoring in Pinole Creek under its HCP through the year 2038. This monitoring method is not proposed specifically for the fish passage project but data from these efforts can be used to supplement project monitoring data.

The principle monitoring method proposed for documenting the presence of steelhead upstream of the project site is steelhead spawning surveys. Spawning surveys are the preferred monitoring method due to the costs and impracticalities involved with directly documenting passage at the project site. The passage project is small in scale and budget compared to many other fish passage projects. Visual, video and acoustic methods of monitoring fish escapement are too expensive to be practical in this case and would likely fail due to conditions typically experienced at the site. Water depths and turbidity at the site during the migration period make these methods impractical. Turbidities during high flow events in Pinole Creek are exceptional, resulting in problematic water clarity for 4 to 5 days after significant rain events (Pearce, S., McKee, L., and Shonkoff, S., 2005). These conditions would result in significant gaps in monitoring during the periods when fish are most likely to be migrating upstream.

Spawning surveys can document passage despite these conditions. These surveys can accurately distinguish between resident and anadromous spawning using redd size as an indicator. Another advantage of spawning surveys for monitoring is that redds are constructed over a protracted period of time and tend to be relatively resilient. These surveys can be conducted subsequent to winter storms when turbidities are low yet, still detect spawning that occurred during high flow events. In addition, EBMUD has conducted annual spawning surveys in Pinole Creek since

2008, providing sufficient baseline data to compare with post-project results.

A 5 year monitoring program, consisting of annual spawning surveys and monitoring of the passage improvements is proposed to determine project success (Table 1). Previous monitoring efforts in Pinole Creek and other East Bay creeks indicate that up to 5 years of monitoring may be needed to effectively demonstrate passage at the structure. Anadromous runs in local creeks have a high degree of variability. In many years, these creeks see little to no contribution from anadromous fish and persist primarily through resident spawning during those periods. A 5 year monitoring program will likely detect anadromous fish spawning despite such variability and will provide enough information should conditions in any particular year make surveys ineffective due to factors such as protracted high flows or extreme turbidity.

Spawning survey effort will consist of at least 2 surveys annually, during the peak fish migration period, in spawning reaches with the greatest spawning potential as determined from previous habitat mapping efforts (EBMUD, 2010). Redds from resident and anadromous fish will be counted and compared to pre-project baseline surveys. Success of the project will be determined based on an increase in the number of steelhead redds as compared to the baseline period or on observed increase in frequency of spawning steelhead during the 5 year period.

Photo monitoring of the fish passage improvements will be conducted annually during the spawning season at a variety of flows. The number of photo monitoring surveys will vary from year to year with the purpose of capturing a full range of flows that may be experienced at the site during the spawning season. Photos will be used to demonstrate that fish passage improvements are functioning properly and providing fish passage as designed. A stream gauge will be placed in the structure and depth readings will be recorded at the time of photo monitoring to demonstrate sufficient depths exist for fish passage in the structure at low flows.

Precipitation data will be collected in the Pinole Creek watershed during the 5 year monitoring period. This data will be used to classify the water year type and to correlate monitoring data from the structure with rain events.

In addition to spawning and photo monitoring surveys, the following inspection and maintenance activities will be completed by Caltrans, the Flood Control District and/or the RCD to ensure the proposed project functions as designed. These inspection and maintenance requirements are also summarized in Table 2.

- Structural items in culvert system. The culvert structure will be inspected bi-annually by Caltrans during their standard bridge inspection. This inspection will focus on identifying spalling or cracking of concrete or exposure of reinforced steel within the fishway notch or along the baffles, sill, or training walls; fatigue or potential failure of concrete anchors associated with baffles or training walls; and gaps that result in seepage under baffles or training walls.

Table 1 Monitoring Schedule and Success Criteria.

Survey Item	Description	Schedule			Success Criteria
		Annually	Variable	Five Year Summary	
Project Specific Data Monitoring					
Steelhead Spawning	Redd surveys conducted 2-3x from January -March - EBMUD	X			Observed increase in steelhead spawning numbers or frequency over 5 year period
Photo Monitoring	Conducted at various flows to document passable conditions - EBMUD		X		Assessments indicate the structure provides passage over a range of flows
Precipitation Data	Continuous precipitation monitoring using a rain gauge installed within Pinole watershed- EBMUD	X			Structure design is suitable to promote adult steelhead passage during most water year types
Supplemental Data Assimilated from Existing Sources					
Ambient Water Quality Data	Temperature and dissolved oxygen - EBMUD			X	Water quality is sufficient to support summer rearing of steelhead upstream of the structure
Stream Barrier and <i>O. mykiss</i> Habitat Mapping Assessments	Assessments to be conducted in 2014 and 2017 -EBMUD			X	Quality spawning and rearing habitat is documented
Electrofishing Data	<i>O. mykiss</i> presence/ absence data collected every 2 years - EBMUD			X	Steelhead or rainbow trout recruitment is documented

- Inspection of roughened chute in flood control channel. Rock placed in channel will be inspected annually and following large flood events to assess the condition of the embankments including indications of scour and RSP displacement; erosion and shifting or displacement of structure rocks in that may inhibit fish passage or compromise the structural stability of the chute; displacement of rock in the outlet pool between the culvert and roughened rock chute; erosion of the bed or banks in the pool at the downstream end of the roughened channel; and shifting or displacement of rock within the pre-project rock chute located downstream of the culvert outlet apron.
- Inspection for debris. Annual inspections prior to the onset of fall rains and after large flow events capable of transporting debris will be completed to assess accumulation of debris at the inlets of the culverts and on baffles, as well as in the flood control channel.

Table 2. Proposed Inspection and Maintenance Schedule

Inspection Item	Responsibility	Inspection Schedule		
		Annually (Late Spring)	Bi-Annually	After Major Storms
Culvert System				
Structural Elements	Caltrans		X	
Debris Accumulation	Caltrans, Flood District	X		X
Sedimentation	Caltrans, Flood District	X		
Flood Control Channel				
Rock Shifting and Displacement	Flood District, RCD	X		X
Channel Scour Downstream of Rock Chute	Flood District, RCD	X		X
Debris Accumulation	Flood District, RCD	X		X

These inspection efforts will ensure that the structure is properly maintained and that it functions as designed to provide fish passage. Information gathered from these efforts along with spawning, photo monitoring and rainfall data will demonstrate the effectiveness of the fish passage improvements at various flows and water year types.

Funding

EBMUD has committed to at least 5 years of post-project spawning surveys and photo monitoring to document success of the fish passage project. In addition, spawning surveys in the upstream reaches of Pinole Creek will continue beyond 5 years, likely at a reduced level, as part of EBMUD's HCP monitoring. These surveys will provide data to demonstrate that the improvements continue to provide passage to steelhead in the long term. Caltrans, the Contra Costa County Flood Control District and the Contra Costa County RCD have committed to inspections and long term maintenance of the structure.

Reporting

Annual reports will summarize the previous year's monitoring efforts including spawning surveys, precipitation data and photo monitoring surveys. Data from EBMUD's ongoing HCP monitoring such as electrofishing and habitat data will be used to supplement spawning survey data collected for this project. Reports will discuss monitoring results and determine if data indicates that steelhead are able to pass the I-80 culverts and spawn upstream. A final report, in year five, will summarize results from the 5 year monitoring effort and conclusions regarding the success of the passage project.

References

- EBMUD, 2008. The East Bay Municipal Utility District Low Effect East Bay Habitat Conservation Plan. 128p.
- EBMUD. 2009. Upper Pinole Creek Watershed Salmonid Habitat Assessment. East Bay Municipal Utility District Report. 17pp.
- EBMUD, 2010. Upper Pinole Creek Salmonid Migration Barrier Assessment. EBMUD Fisheries and Wildlife Division Report. 11p.
- Pearce, S., McKee, L., and Shonkoff, S., 2005. Pinole Creek Watershed Sediment Source Assessment. A technical report of the Regional Watershed Program, San Francisco Estuary Institute (SFEI), Oakland, California. SFEI Contribution no. 316, 102 pp.