Pinole Creek I-80 Fish Passage Project
Fisheries Monitoring Report
2017

East Bay Municipal Utility District
Natural Resources Department
Fisheries & Wildlife Division
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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 1,000 feet. 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. Pinole Creek maintains a population of steelhead/rainbow trout (*Onchorynchus mykiss*) which is a subpopulation of the federally threatened Central California Coast Steelhead.

In the past, the CalTrans culvert at Highway I-80, approximately 1.5 miles upstream from San Pablo Bay, was a barrier to steelhead migration at high and low flows. The I-80 culvert consists of dual 12’ wide by 10’ high 320 foot concrete box culverts with concrete sills on the upstream and downstream ends. Watershed assessments have demonstrated that the I-80 culverts were the only significant barrier to fish passage into the upper watershed (EBMUD, 2009; EBMUD, 2010. Hagar, 2009).

The I-80 Fish Passage Project, completed in October of 2016, was designed to allow passage of steelhead through the left (western) culvert bay. The fish passage design consisted of 3 main components, a fish ladder at the upstream end of the left culvert, a curb at the downstream end of the left culvert and an engineered channel consisting of rock weirs downstream of the culverts.

As a project partner, EBMUD committed to monitoring fish passage at the culverts for five years following the construction of the fish passage improvements. The 2014 Pinole Creek Fish Passage Monitoring Plan described the monitoring methods proposed to document improved passage for steelhead at the I-80 culverts. The principle monitoring method proposed for documenting the presence of steelhead upstream of the project site was spawning surveys. Spawning surveys were the preferred monitoring method due to the costs and impracticalities involved with directly documenting passage at the culverts. Other monitoring methods described in the plan include collection of rainfall data and periodic inspections of the fish passage improvements to ensure proper function.

EBMUD has committed to a 5 year monitoring effort consisting of at least 2 steelhead spawning surveys annually in suitable habitat in Pinole Creek upstream of I-80. These surveys will occur during the peak fish migration period, focusing in spawning reaches with the greatest spawning potential as determined from previous spawning surveys and habitat mapping efforts (EBMUD, 2014). Spawning surveys are designed to enumerate redds and determine if they have been constructed by resident or anadromous fish. After 5 years, redd data will be compared to pre-project baseline surveys previously conducted by EBMUD on an annual basis in the years prior to project completion. Project success will be determined based on an observed increase in the number or (annual) frequency of steelhead redds as compared to baseline.

**Methods**

EBMUD biologists completed 5 spawning surveys in Pinole Creek between January 31st and March 20, 2017. Four surveys were conducted on EBMUD Pinole Valley watershed lands and
Figure 1. Pinole Creek Redd Locations 2017.
one survey was conducted downstream within the Pinole city limits. The stretches surveyed for the season represent less than half of the overall spawning habitat available to salmonids in Pinole Creek. Surveys were completed by a crew of at least 2 individuals. Surveyors walked upstream in the creek looking for signs of salmonid spawning activity and recorded all redds (nests) that were judged to be at or near completion. All redds were marked with flagging on nearby vegetation and a GPS position was recorded for each redd. Each redd was classified as a resident or anadromous redd based on size and shape of the redd and tailspill as well other characteristics such as the size of gravel moved during construction. Judgments were made on a conservative basis with redds of questionable origin assigned to the resident fish or unknown designation. Redd locations and characteristics were recorded in the field with a Trimble Geo XH and downloaded to a GIS database. Characteristics recorded for each redd included description of any fish observed, gravel size, tailspill depth, habitat type and other related observations or notes.

Daily precipitation and creek stage data provided by the California Data Exchange Center (CDEC) were monitored in Pinole Creek during the spawning season. Rainfall data from the rain gauge at Arroyo Del Hambre (ABA) and creek stage data from the Pinole Creek at San Pablo (PSP) sensor were evaluated. In addition, EBMUD biologists installed water level loggers to measure creek stage near the Tomato Stand on the EBMUD watershed and just downstream of the I-80 Fish Passage Project in the lower watershed (Figure 1).

Periodic visits to the I-80 culverts to observe passage conditions were scheduled during the spawning season. The culverts were inspected for debris accumulation and erosion, as practical, to ensure proper functioning of the fish passage improvements. Photographs were taken at various flows experienced during the spawning season to document conditions.

Results

On the afternoon of January 31, 2017, EBMUD staff completed a salmonid spawning survey on Pinole Creek in the stretch from the Pinole Valley Park footbridge up to Bridge #6 and from downstream of the USGS gauge to the Pinole Y (intersection of Pinole Valley Road, Castro Ranch Road and Alhambra Valley Road). No redds or fish were observed in these reaches. Water clarity was not optimal and visibility was limited to about 6 to 8 inches due to recent storm activity.

On the morning of February 1, 2017, EBMUD staff conducted a salmonid spawning survey in Pinole Creek from the Tomato Stand to just before the Pinole Waterfall. No redds or fish were observed during the survey. There were several deep pools in the channel. The water in some areas was slightly turbid but conditions were still suitable for a survey.

On March 3, 2017, EBMUD staff attempted to conduct a salmonid spawning survey in Pinole Creek near the Pinole Waterfall. Water clarity was very poor so the redd survey was postponed. Representative photos were taken to document changes to the creek channel resulting from the degradation of the waterfall.

On March 14, 2017, EBMUD staff conducted a salmonid spawning survey in Pinole Creek. A section above the Pinole Y was surveyed, as well as the stretch between the Tomato Stand and
the Pinole Waterfall. Water clarity was decent, although somewhat murky. Eleven redds were recorded and three fish were seen (approximately 6, 8, and 12 inches in length).

On the morning of March 16, 2017, EBMUD staff and volunteers conducted a salmonid spawning survey in Pinole Creek from Simas Avenue upstream to Amber Schwartz Park within the Pinole city limits. The crew also checked the creek at the footbridge in Pinole Valley Park to take a look for spawning activity after stopping the survey several hundred feet downstream due to deep water conditions. Flows in the creek were higher than normal, making survey conditions difficult. Water clarity was good with visibility of over 1 foot. No redds were observed in the stretch from Simas Ave to Amber Schwartz Park. One redd was observed in the riffle below the footbridge in Pinole Valley Park. This redd was classified as having been built by a resident fish.

On the afternoon of March 16, 2017, EBMUD staff conducted a salmonid spawning survey on Pinole Creek from the Tomato Stand to the Box Culvert under Bear Creek Road. Nine redds were observed in this stretch.

On the afternoon of March 20, 2017 EBMUD staff completed a salmonid spawning survey on Pinole Creek from just below the USGS weir to above the Pinole Y. Three redds were observed in this stretch.

A total of 24 *O. mykiss* redds were observed during 6 spawning surveys in Pinole Creek for the 2017 spawning season. Two of these redds were judged to have been built by steelhead due to the large gravel and cobble in the tailspill. Five redds were possibly built by steelhead or large resident rainbow trout. These redds has large circumferences but the size of the spawning substrate utilized consisted of small gravel. Seventeen redds were likely built by resident rainbow trout. All but one of the redds were found on EBMUD watershed lands where most of the survey effort was concentrated. Most of the redds were found upstream of the Pinole Y. Redd locations can be found in Figure 1.

Figure 2 shows the daily precipitation totals and the daily max creek stage for the period of October 2016 through September 2017. Rainfall data shows the significant number of large storms experienced in the January through April period as well as the unusually large total rainfall experienced this past rainy season, with total rainfall of 40 inches in the watershed (CDEC ABA). Annual rainfall in the area is about 20 inches on average. Max creek stage heights were recorded on January 10, 2017 and February 7, 2017. The glide above the Tomato Stand culvert had a depth of 10 ft and 9 ft on these occasions. The glide below the I-80 culvert had creek stage heights of 7.5 ft and 6.5 ft for the same dates. A new creek stage sensor on Pinole Creek was installed in March 2017 at San Pablo Ave in Pinole (CDEC PSP). The sensor is located 0.8 miles downstream of the I-80 project. The sensor was installed after the peak creek stages occurred in January and February, but March data aligns with the data collected by the EBMUD loggers. Creek stage measurements near the fish passage project show that water depths were sufficient throughout the spawning season for fish passage. Peak flows may have presented a velocity barrier for steelhead for short durations during the spawning season.

Culvert inspections were made on January 8, January 25 and March 19, 2017. On January 8, a tree stump was observed lodged at the upper end of the culvert. This obstruction had cleared by
the subsequent survey on January 25th. No other significant obstructions or erosion was observed on subsequent visits. Despite heavy rainfall, the fish passage improvements in the culvert and the rock weirs downstream did not exhibit any damage or erosion. The structures were observed to be functioning as designed throughout the rainy season and through the following summer. See Appendix A for photos from these site visits.

![Pinole Creek Stage](image.png)

**Figure 2. Local Rainfall and Pinole Creek Stage Data 2016-2017.**

**Discussion**

Monitoring data from the 2017 spawning season indicates that the Pinole I-80 Fish Passage project is achieving the primary goal of providing fish passage at the structure for adult steelhead returning to spawn in Pinole Creek. Fish Xing analysis of the culvert before modifications indicated that the structure was a barrier to fish passage under both high and low flow conditions. Rainfall and creek stage data indicate that low flow conditions in the culverts were not an issue during the 2017 spawning season and that water depths were sufficient for fish passage throughout the spawning run. Evaluation of the effectiveness of the fish passage design at low flows will need to be done in a drier winter with longer gaps between storms.

Personal observations by EBMUD staff prior to the project indicate that periods of low flow in the culvert were more problematic for fish passage than high flows because the highest flow events are typically of short duration in Pinole Creek and fish could likely pass the culverts as stormflows recede. Poor passage conditions at the culverts due to low flows have been documented in the past by EBMUD biologists. Steelhead were observed spawning downstream in the flood control channel, in 2002, after being unable to pass the culverts during a prolonged dry spell in February of that year. On other occasions, steelhead and salmon have been observed holding just downstream of I-80 during prolonged dry periods.
Spawning survey results for the 2017 spawning season demonstrate that adult steelhead were likely able to pass the structure as indicated by the large redds observed upstream. While turbidity in the creek did not allow confirmation that the redds were built by steelhead, these redds were too large to have been built by resident fish. It is possible that these redds could have been built by salmon that strayed into the drainage. However, it is more likely that these redds were built by steelhead as salmon have rarely been observed in Pinole Creek. In addition, EBMUD electrofishing surveys this summer found only *O.mykiss* young of the year on the EBMUD watershed upstream. Despite their maternal origin, these redds demonstrate that anadromous fish passed through the I-80 culverts to spawn upstream.

Monitoring results indicate that the Pinole Creek I-80 Fish Passage Project met its goal of passing anadromous fish in the first spawning season following installation. Most of the resident and all of the steelhead redds were observed upstream of the Pinole Y on the EBMUD watershed. The catastrophic failure of the Pinole Y culvert at this location in January of 2017 does not seem to have significantly impacted fish migration into the upper watershed. Visual observations at the culverts indicate that hydraulic conditions at the culvert were sufficient for fish passage during most of the spawning season. The engineered channel downstream of the culvert, the training wall in the lower culvert and the fish ladder at the upper end of the culvert all appeared to function as designed to pass fish. After the first year, there are no signs of any significant erosion, debris accumulation or sedimentation that might affect fish passage at the structure. Monitoring suggests that the project is functioning as designed.
REFERENCES

California Data Exchange Center, Arroyo Del Hambre station (CDEC ABA).

California Data Exchange Center, Pinole Creek at San Pablo station (CDEC PSP).


APPENDIX A.

I-80 Culvert Photos

I-80 Culverts January 8, 2017

I-80 Culverts January 25, 2017