

## Technical Memorandum

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Prepared for: **Roger Leventhal, Principal Engineer**  
**FarWest Restoration Engineering**

Prepared by: **Hagar Environmental Science**

### Codornices Creek Post-Project Habitat Reconnaissance

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The reach of Codornices Creek between the Union Pacific Railroad (UPRR) right-of-way and 6<sup>th</sup> Street was surveyed on October 22, 2009 to assess the general stream habitat condition following a stream restoration project. The restoration project between the UPRR and 5<sup>th</sup> Street was initiated with grading in 2004 and completed with re-vegetation in 2005. The project between 5<sup>th</sup> Street and 6<sup>th</sup> Street was completed in 2006. The survey was conducted at the request of FarWest Restoration Engineering to:

- estimate the frequency and relative extent of pool and riffle habitat types in the study reach (UPRR to 5<sup>th</sup> Street) and measure pool depths;
- evaluate the extent of cover in the study reach and characterize the habitat in terms of ability to support steelhead in comparison to other Central Coast streams;
- note the presence of any fish migration passage obstacles;
- provide a qualitative assessment of macro-invertebrate populations that are visible at the time of the survey; and
- record any observations of trout or steelhead (*Oncorhynchus mykiss*), California red-legged frog (CRLF), or other aquatic life visible during the time of the survey

High flows occurred after significant precipitation on October 13 and again on October 19. The October 13 storm was the remnants of typhoon Melor and rainfall amounts were unusually high, totaling 3 to 4 inches in the East Bay hills in the 24-hour period ending at 4 am on October 14 (National Weather Service, California Nevada River Forecast Center, observed precipitation, San Francisco Bay Area). The October 19 storm was more typical of winter storms in this area, though early, with precipitation totals of 0.24 to 1.10 inches in the East Bay. During the October 22 survey there was evidence of high flows well over bankfull and onto the floodplain of the creek, likely from the October 13 storm. Water clarity was good at the time of the survey.

The stream channel of Codornices Creek in the project area is lined with dense riparian vegetation including dense willows to a height of 12 to 18 feet and a few alder and sycamore saplings. A few areas had cattail growing in the channel including just upstream from the UPRR and upstream from the 5<sup>th</sup> Street pedestrian bridge. The trees provide a canopy of 90% to 95% coverage in most of the stream reach. This canopy provides extensive shade throughout the day and is expected to result in cooler stream temperature than would occur in its absence.

The wetted stream width is relatively narrow, averaging 5 to 7 feet throughout the restored reach. Stream macro-habitat consists of about 56% pool, 23% riffle, 12% run, and 9% glide. Pools had maximum depth ranging from 1.1 to 2.3 feet and were most commonly 1.3 to 1.5 feet at the deepest point. The pools generally had good cover provided by undercut banks, undercut roots, and overhanging terrestrial vegetation, primarily low hanging willow branches and in some cases by cattail.

Riffles were relatively short, ranging from 1 to 30 feet but averaging 8 feet. Almost 60% of riffles were 7 feet or less in length. Many of the riffles were over the entwined fine roots of the riparian willows and these root mats formed much of the substrate in the riffles. Elsewhere the substrate was predominantly small gravel/sand or hard clay pan. Substrate suitable for steelhead or rainbow trout spawning was relatively scarce, totaling only about 35 square feet or about 4 square feet per 100 feet of stream. Spawning substrate was of moderate quality with relatively small gravel, not much silt, but fairly sandy. The substrate appeared relatively clean in most areas and free of silt, likely as a result of the recent high flows.

There were no significant migration obstacles in the survey reach although, due to the stream's small size, passage through riffles would be limited under baseflow conditions. The pool tail/riffle head areas were generally about 0.2 feet deep. The most critical riffle observed was a steep drop over a willow root mat that averaged about 0.1 feet deep (Photo 1). These conditions are to be expected in a stream the size of Codornices Creek with adult steelhead migration passage limited to periods of storm runoff. The relatively narrow width and steep banks of the low-flow channel should result in a relatively large increase in flow depth with increases in streamflow at these riffles.

No macro-invertebrates were observed in the study reach. This was likely a result of the small substrate size, recent high flows, and time of year. The small gravel/sand substrate does not have large pore spaces to support benthic macro-invertebrates and is easily mobilized under high flows. The high flows immediately preceding the survey appeared to have scoured the substrate of all periphyton, algae, and other life. The extensive willow root mats likely provide good habitat for certain types of benthic invertebrates but none were observed on the surface of the mats, possibly also related to the recent high flows. Water temperature has likely cooled significantly from summer levels and benthic invertebrate populations may be at seasonal lows.

Trout, one young-of-year at about 3 inches in length and one older individual at 5-6 inches in length, were observed at the upstream end of the culvert under the UPRR. Trout are generally not as visible in the winter due to cooler water temperatures, lower metabolism and activity levels, and the need to shelter from high flows. Cooler temperatures and recent high flows may have resulted in lower activity levels and any trout present may have been in cover. The best way to assess the presence of trout or other fish species would be to conduct an electro-fishing survey. The presence of steelhead would best be accomplished by conducting surveys during the spawning period (December through March) to look for spawning adults or recently constructed redds. Codornices Creek in the project reach supported rainbow trout before the restoration project (HES 2005, HES 2006). Most of the fish were in the relatively deep scour pool and culvert at 5<sup>th</sup> Street and in an overgrown concrete box culvert in the lower part of the reach between 5<sup>th</sup> Street and the UPRR. The pools in the restored reach are developing (in terms of depth and cover) to the point where they could support rearing *O. mykiss* to smolt size (about 150 mm or 6 inches) or resident trout.

## **References**

- Hagar Environmental Science (HES). 2005. Codornices Creek Restoration Activities Between 2<sup>nd</sup> Street and 5<sup>th</sup> Street, Fish Removal Activities. Technical Report prepared for City of Albany. March 11, 2005. 11 pp.
- Hagar Environmental Science (HES). 2006. Codornices Creek 5<sup>th</sup> Street Culvert Removal and Channel Modification, Fish Salvage Activities, August 2006. Technical Report prepared for City of Albany. September 26, 2006. 11 pp.



Photo 1. Critical passage riffle formed by willow root mat.