Codornices Creek Restoration Project

2019 Monitoring Report

Phase 3 Geomorphic Monitoring

RWQCB Permit number: 02-01-C0763
USACOE Permit number: 28288-1S
DFG Notification Number: 1600-2006-0169-3

City of Albany / City of Berkeley

Appendices:
Appendix A: *Phase 3 Cross Section Locations*

Prepared By:
Restoration Design Group
2332 5th Street, Suite C
Berkeley, California 94710

Codornices Creek Monitoring 2019

1. Overview

This report presents the 2019 monitoring results for Phase 3 of the Codornices Creek Restoration Project and follows the December 2018 Monitoring Report that summarized that year's vegetation monitoring of Lower Codornices Creek.

To date, three phases of Codornices Creek restoration have been completed. Phase 1 was completed in 2005, Phase 2 in 2006 and Phase 3 in 2010. Table 1 below is a calendar of scheduled monitoring activities for the three phases of the Codornices Creek Restoration Project for 2019. Geomorphic surveys were completed for Phase 3, Year 8.

Table 1: Monitoring Calendar

Calendar Year 2019				
Phase	*Geomorphic Survey*	*Vegetation Survey*	*BMI Survey*	*Fish Survey*
I	Complete	Complete	Fall 2016	Fall 2016
II	Complete	Complete	Complete	Complete
III	Spring 2019 (Yr.8)	Completed 2018	None (Yr. 9)	None (Yr. 9)

1. Geomorphic Survey

Phase 3 – Year 8

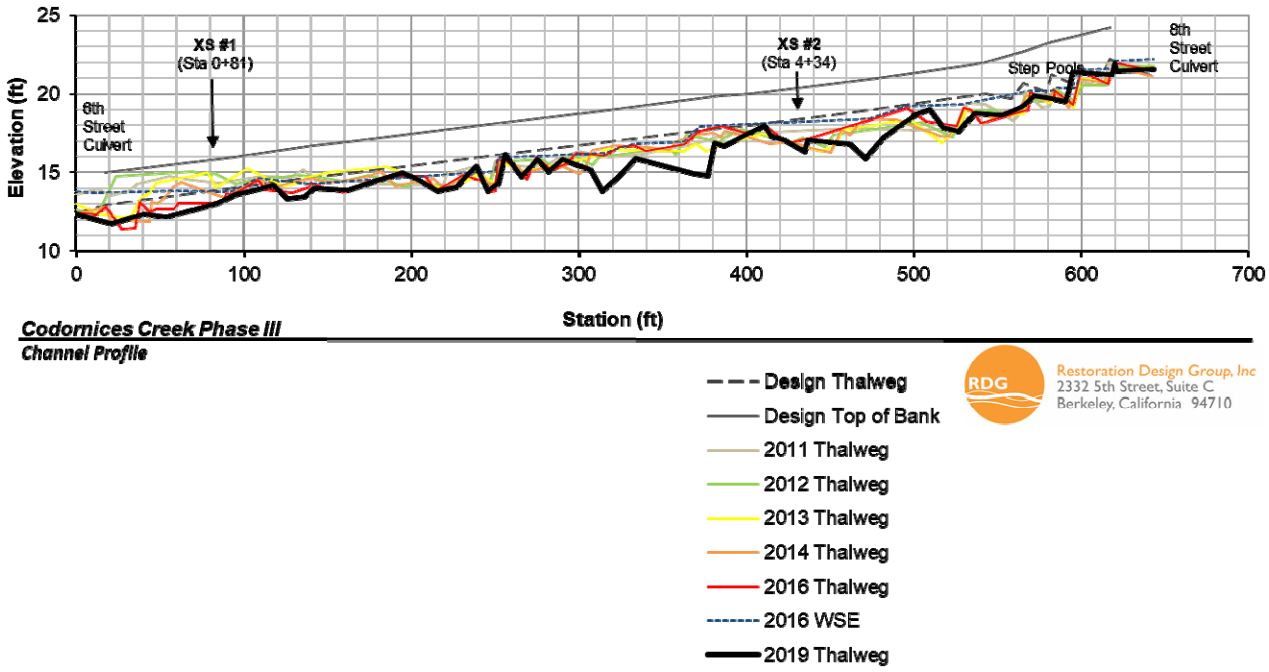
1.1. Methods

Profile and cross section surveys were completed in 2019 for Phases 3 to complete year 8 monitoring. Cross sections are from established and monumented locations.

1.2. Results

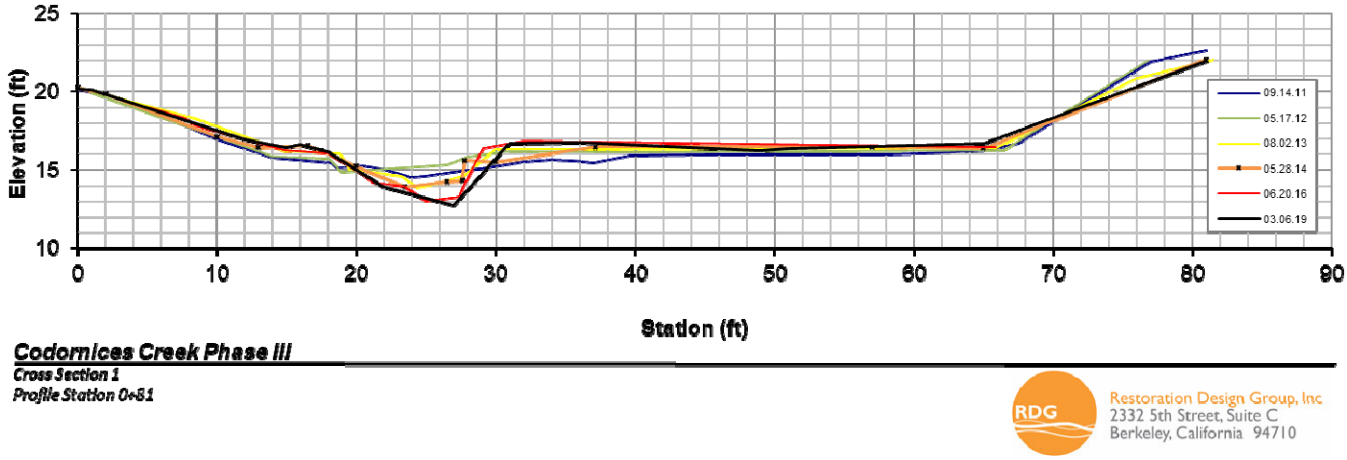
1.2.1. Channel Profile Phase 3

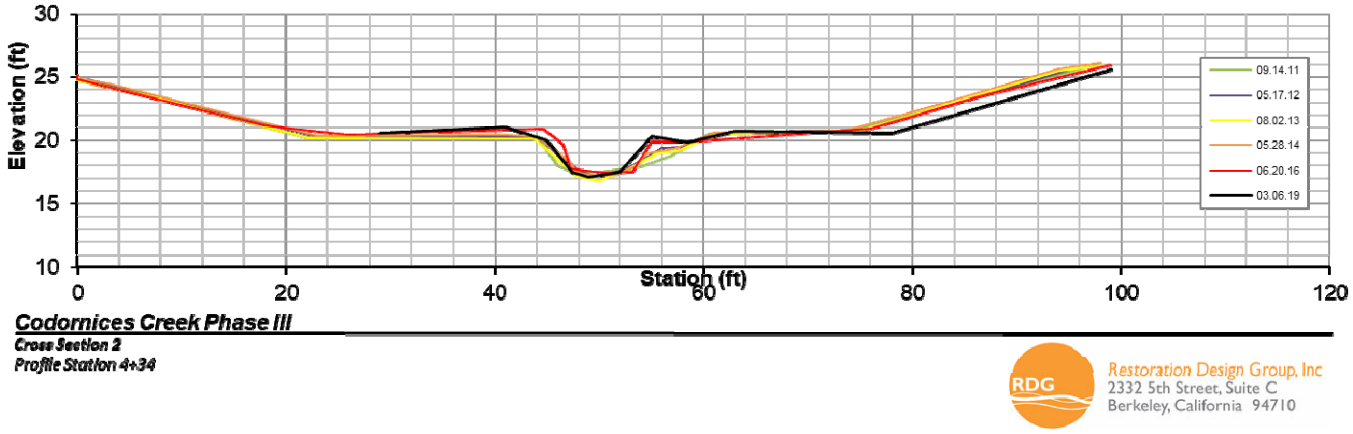
Riffle and pool morphology continue to develop within the channel with the exception of areas scoured to hardpan. The hardpan is hampering sediment deposition in these areas and limiting development of depositional feature such as point bars. There are some areas of concern where channel degradation has occurred near where the hardpan has been exposed.



1.2.2. Cross Sections Phase 3

The two riffle cross sections were resurveyed in 2019. Cross section #1 is in the lower portion of the creek and is influenced by the culvert backwater. Cross section #2 is upstream in the location adjacent to the hardpan bed. Cross section 1 has remained stable after narrowing the first four year after construction. Cross section 2 has also remained stable after building an inner depositional bench the first four years after construction. The thalweg has maintained a consistent elevation for the duration of the monitoring period.





1.3. Discussion

Phase 3 continues to mature. We have been monitoring two areas closely since the project was constructed. The first area is immediately upstream of the 6th Street culvert, where the channel adjusted immediately after construction. The second area is the upper half of the restoration reach, where the channel has exposed hardpan. The following provides an update for each of these areas.

Above 6th Street Culvert – The hydraulics of the culvert backwater resulted in deposition of sediment in the channel upstream of the culvert and a near immediate evulsion and straightening of the channel leading into the culvert. The changes to the channel have slowed, indicating that the channel has reached an equilibrium condition. The resulting changes have led the channel hydraulic geometry to adjust to better match the hydraulic geometry of the culverts. Competency was increased due to the increased channel slope resulting from the evulsion and with continued deposition of the floodplain at the culvert. As a result, the channel has reached a more stable configuration and no adaptive management is required at this time.

Expose Hardpan –The exposed hardpan upstream continues to persist. This hardpan substrate excludes any opportunity for hyporheic flow and does not provide ideal habitat for benthos. This condition is not unique to the restoration areas. A similar condition exists upstream of the project site between 8th and 9th street.

Monitoring of this condition began during the first winter after construction and has not shown any indication of improvement. The channel has incised 1-foot below the design grade in many

areas, with a few locations up to 3-feet, resulting in increased stream power near bankfull flows. In addition, the floodplain is no longer inundated at the designed frequency.

In the lower part of the hardpan, the creek seems to have eroded through the hardpan down to a softer substrate. We will continue to monitor this development.

We have recommended two approaches to address this condition in prior reports. The first is to construct rocked riffles that raise the grade. While this can work and has some benefits, it is not the preferred approach. Instead we recommend using wood, either as a passive or active approach to provide additional roughness to help capture sediment.

Although Codornices Creek is an urbanized watershed it does transport a significant amount of sandy gravel as bedload. This bedload can be encouraged to deposit in the channel to burying the hardpan overtime.

Naturally fallen trees or other smaller woody debris can help catch the deposit and fill some of the areas where the exposed hardpan has caused deeper incision.

We have observed deposition occurring in phase 1 and phase 2 naturally, where willows have matured to a state where they are beginning to fall across the channel. These willows have created minor debris jams that pond water behind them and capture and store significant sediment.

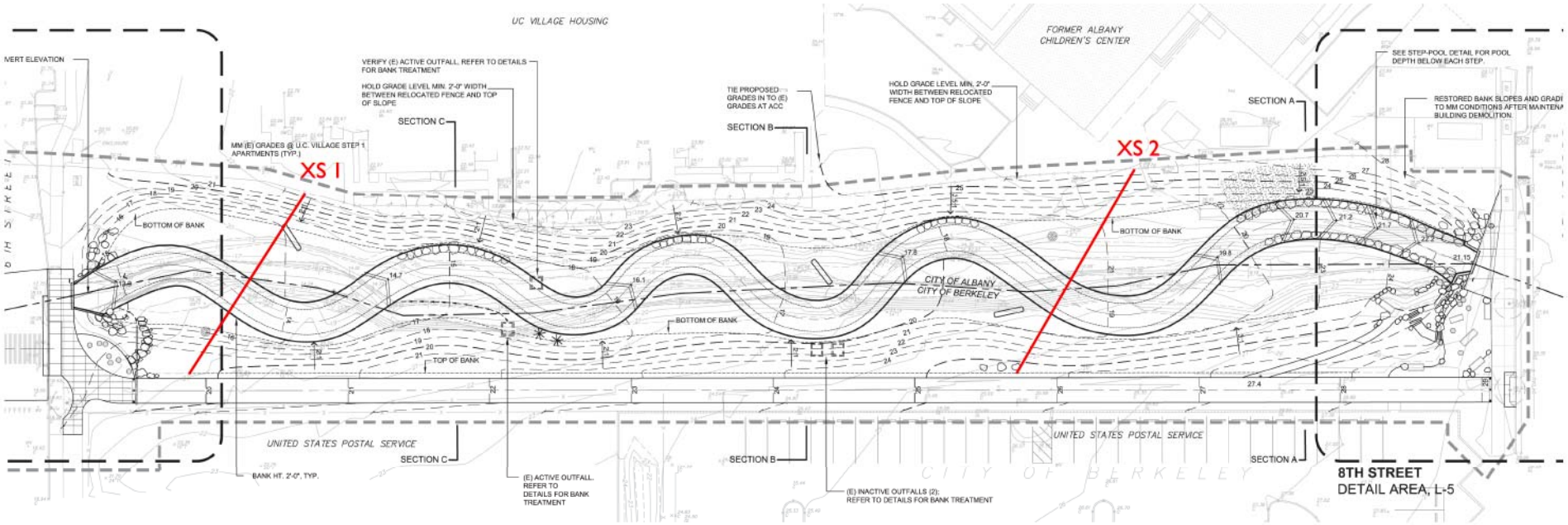
If this process were to occur throughout Phase 3, we would see backwater caused by the debris jams burying the hardpan with deposited sediment. This process has already occurred within Phase 3 at station 3+08, where a mature willow that was preserved during construction partially collapsed into the channel in 2013 and trapped sediment upstream. This observation indicates that this process should continue to be encouraged as a strategy to mitigate for the exposed hardpan.

In addition, this process could be actively encouraged through the installation of constructed debris jams. This technique has been popularized in recent years throughout California and the west and is often referred to as a Beaver Dam Analog (BDA), due to their function being like that of a dam constructed by a beaver. RDG has had success constructing these for the last 10 years throughout the Bay Area and they have shown to capture sediment quickly with the use of only natural woody material. This would be an excellent activity for a community event to highlight this type of restoration technique.

1.4. Maintenance Recommendations

1.4.1. Allow vegetation to remain in the channel to encourage minor debris jams and backwatered pool habitat. Use small limbs pruned off willows and place downstream of pools perpendicular to channel.

1.4.2. Consider actively installing woody debris jams similar to Beaver Dam Analogs to accelerate deposition within this reach.



Codornices Creek Phase III

Cross Section Locations

Restoration Design Group, LLC
2612B 8th Street
Berkeley, California 94710
T 510.644.2798 F 510.644.2799
RestorationDesignGroup.com