# Monitoring stream bank erosion and migration at the Fairfield Osborn Preserve


## Lauryn Hopper and Quinten Rodriguez

Geography Department, Sonoma State University



## Abstract

In the fall of 2014 students in Geography 360, as part of a longitudinal study of creek dynamics, reoccupied creek survey locations established in 2013 at Fairfield Osborn Preserve. Students re-measured longitudinal profiles, and horizontal cross sections at Copeland Creek. Measurements were taken by stadia-rods and auto-levels. Wolman Pebble counts were conducted to discern the bed load of each stream. Bank erosion pins placed in 2013 were measured and additional pins were added along the creek banks. At Copeland Creek erosion occurred along the northern bank, with the erosion pins indicating over 10 cm of bank retreat. At the ephemeral creek the lower cross section experienced significant deposition following the December rainstorm that closed campus.

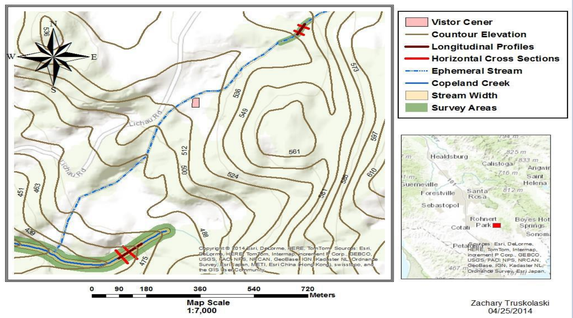



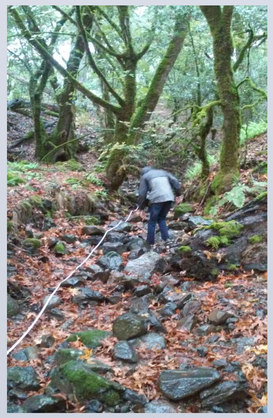

Figure 1

## Methods

Using auto levels we constructed two cross sectional profiles of each creek. Elevation along the cross sections was measured approximately every 0.5 m and related to a temporary benchmark. The cross sections are designated upper and lower for each site (Figure 1).

Bank erosion was surveyed through placement of erosion pins (rebar spray-painted in orange) hammered into the creek banks near the cross section locations. The exposed portions of the rebar were measured in centimeters with a ruler. Greater exposure from one year to the next indicates erosion, less exposure indicates deposition.

Characterization of the bed load was under taken by a Wolman Pebble count. This estimates rock particle size within the creek.



Ephemeral Creek


## Copeland Creek

Copeland Creek is experiencing erosion along its northern bank. This side of the channel is characterized by a steep cut bank face (Figures 2 and 3). Both cross sections show erosion on the northern side but with the lower cross section experiencing the most erosion (~12 cm lost). The south bank is also experiencing erosion ( ~8 cm lost). Overall the stream is maintaining its channel form and overall depth

The Wolman Pebble count (figure 6) shows that this active creek has a bed load characterized by large pebbles in the 128-256 mm range (~ 80%).

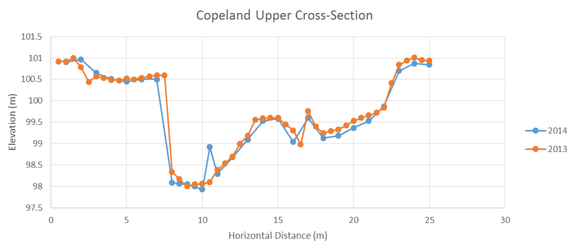



Figure 2

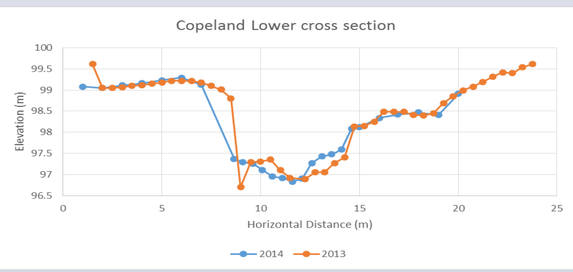



Figure 3

## Ephemeral Creek

The Unnamed Ephemeral Creek only experiences discharge during extreme rainfall events such as atmospheric rivers. One such event prevented our class from re-measuring the upper cross section in the fall of 2014. However, the data from the lower cross section shows that the creek, in spite of its typical dry state, has changed in the course of the year (Figure 4 and 5). Erosion pin data shows that the lower cross section experienced ~ 2 cm of erosion on the south bank, but showed deposition on the north bank, ~1 cm. While we do not have a cross sectional profile of the upstream cross section for 2014, we do have erosion pin data that showed deposition on the north and south banks ~1cm.

The Wolman Pebble count data (figure 7) indicates shows that the majority of pebbles fell between 64 and 128 mm. The large pebbles > 256 mm indicate that the creek is able to move this large material during high flows.

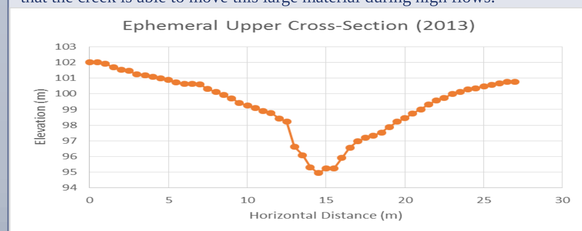



Figure 4

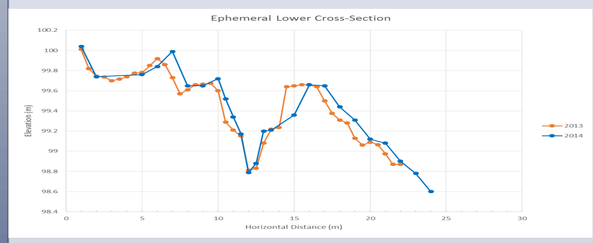



Figure 5

Figure 6

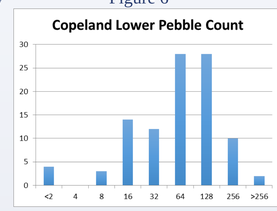
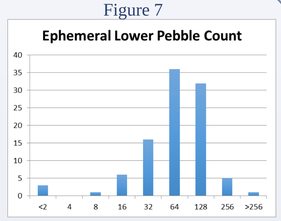



Figure 7




## Conclusions

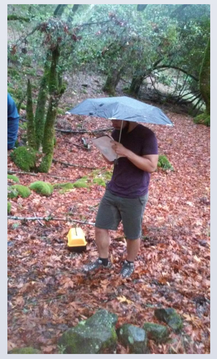
The data from the past two years indicates that both Copeland Creek and the ephemeral creek are actively changing their immediate environment.

- Copeland Creek overall is migrating northward
- Ephemeral Creek thalweg has remained stable
- Ephemeral Creek channel shows minor adjustments

## What the Future Holds

The active migration of Copeland Creek towards the north will begin to undermine the "Creek trail."

Lauryn Hopper



Quinten Rodriguez

Geography 360


## Acknowledgements

SSU WATERS Collaborative for funding to erosion pins.

Professor Michelle Goman for leading this perilous expedition into the wild.



RESEARCH POSTER PRESENTATION DESIGN © 2012
www.PosterPresentations.com