

Evaluation of Proposed Water Quality Credit Generating Locations in the Laguna de Santa Rosa

GEP 396 Water Research Methods, Sonoma State University

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Introduction

- The North Coast Regional Water Quality Control Board determined that absolutely no phosphorus may enter the Laguna de Santa Rosa as a point source pollutant.
- This is problematic for sewage treatment facilities in Santa Rosa and Windsor that are unable to completely remove phosphorus during the wastewater treatment process.
- They have no choice but to discharge effluent containing phosphorus into the Laguna de Santa during high rain events.
- To offset the negative ecological impact of this phosphorus discharge, a Water Quality Trading Credit system was created.
- This system was first used in 2019 when Sonoma Water generated the Water Quality Trading Credits by removing 11,104 cubic yards (1,388 truckloads) of sediment containing 15,000 pounds of phosphorus from the Laguna 1 region of the Laguna de Santa Rosa.
- There is now a need to generate additional phosphorus Water Quality Trading Credits.
- **The goal of this study was to test phosphorus levels from three potential new sediment removal sites (Laguna 2, Laguna 3, and Copeland 1) to determine which site would yield the highest number of Water Quality Trading Credits.**

Methods

SEDIMENT SAMPLING

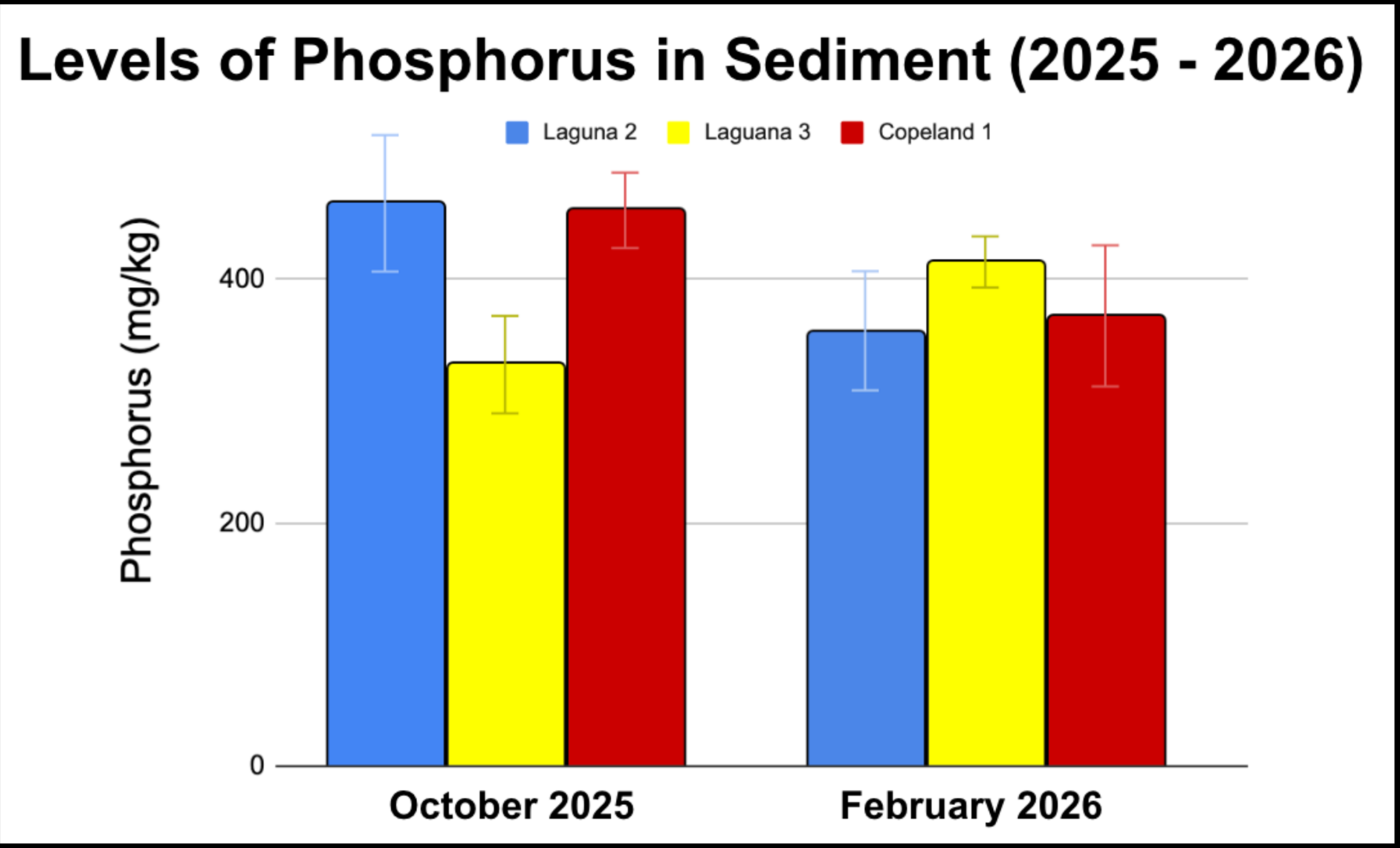
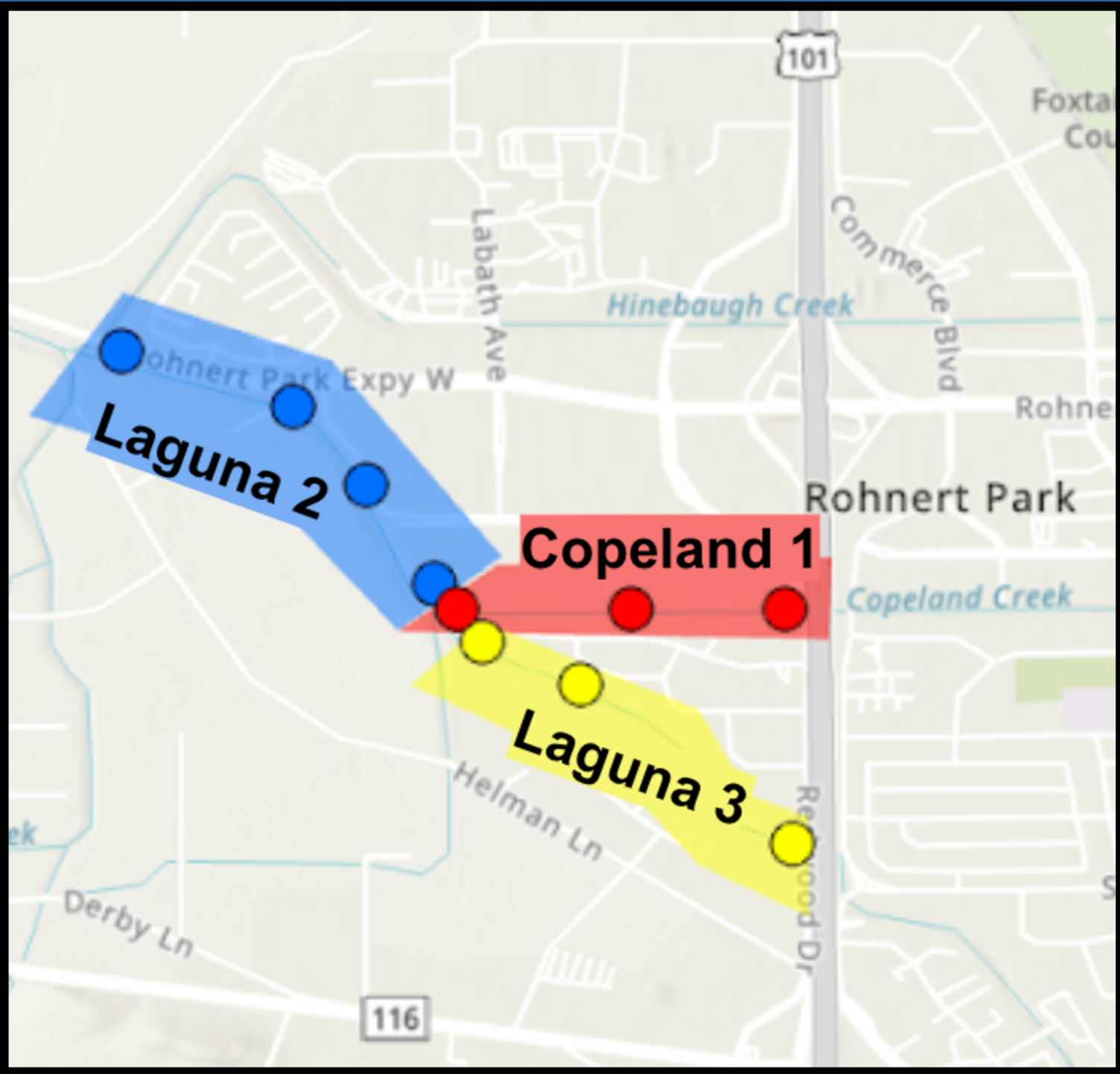
- At each sampling location, a transect line across the creekbed was divided into thirds. A sample was collected from the center of each third.
- A handheld soil auger was used to collect soil 1"-10" deep.
- The three samples collected from each sampling location were mixed to form a composite sample.
- Each composite sample was split between two jars.
- One jar was transported to Santa Rosa’s Laguna Treatment Plant, where EPA Method 6010B was used to determine the phosphorus level.
- The second jar was taken to SSU for bulk density analysis.

BULK DENSITY ANALYSIS

- The samples were air dried for one week.
- A mortar and pestle was used to pulverize the sample before it was passed through a 2mm sieve to collect fine particles.
- The bulk density = the mass of 100mL of the fine particles (using a 100mL graduated cylinder and a balance).



Results



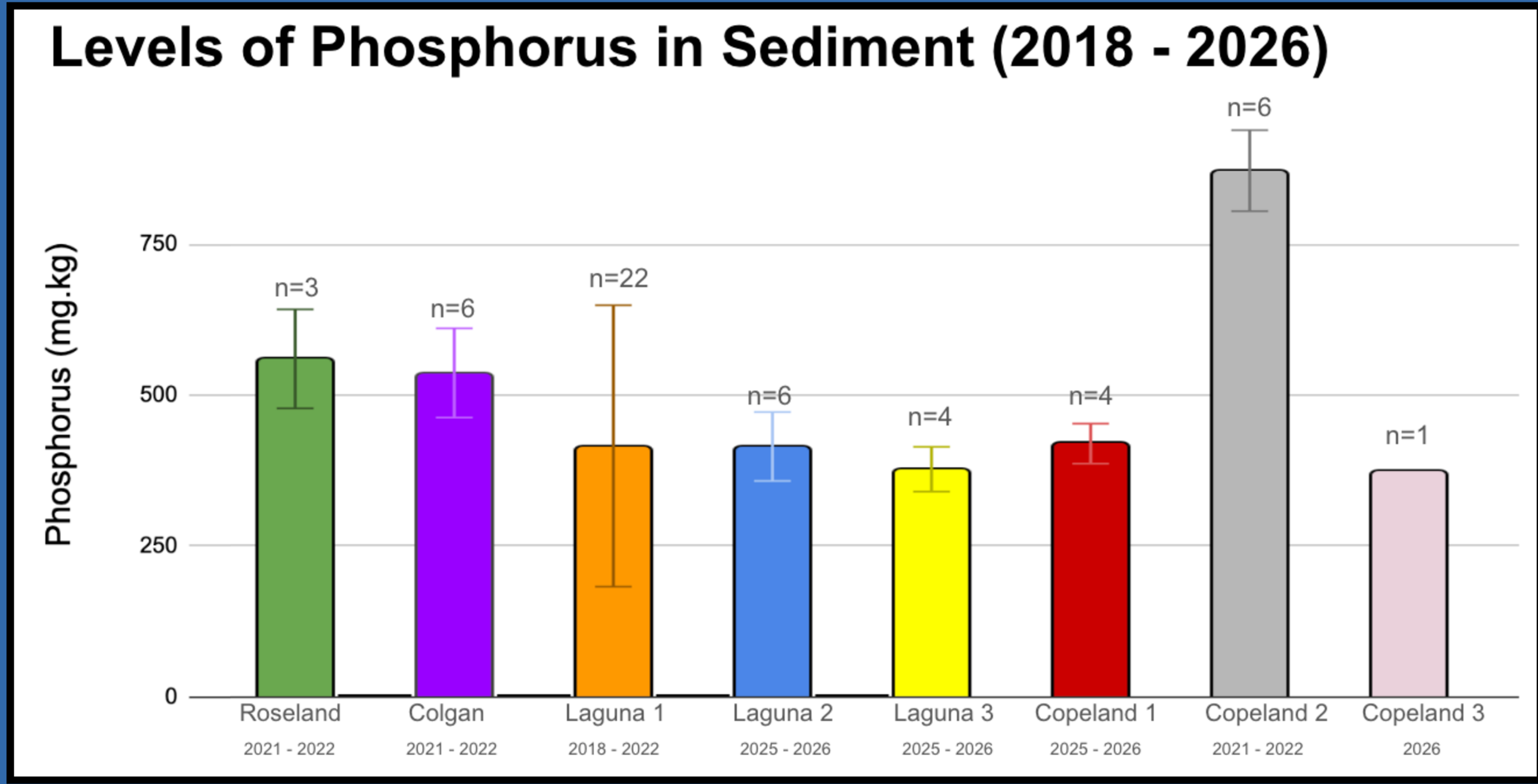
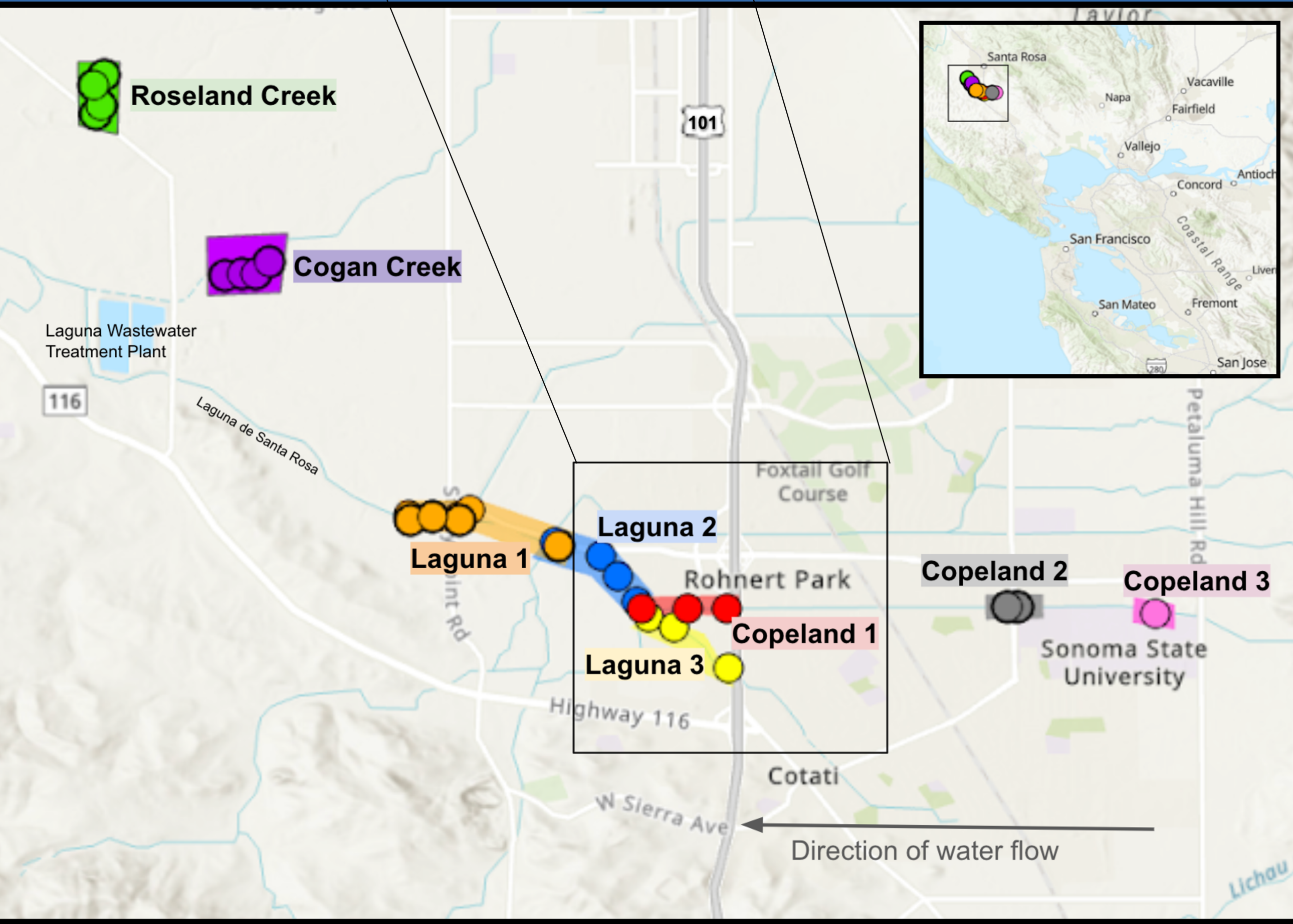
	10/2025 (dry)	2/2026 (wet)
Laguna 2 (1)	490	363
Laguna 2 (2)	500	412
Laguna 2 (3)	480	292
Laguna 2 (4)	380	364
Laguna 3 (1)	330	416
Laguna 3 (2)	290	434
Laguna 3 (3)	370	393
Copeland 1 (1)	490	373
Copeland 1 (2)	450	311
Copeland 1 (3)	430	426

Comparing Laguna 3, Laguna 2, and Copeland 1

- Sonoma Water is considering generating new water quality trading credits by removing sediment at one of three creek stretches: Laguna 2 (blue), Laguna 3 (yellow), Copeland 1 (red).
- Our preliminary October 2025 analysis (upper graph, left side) testing phosphorus levels in sediment at multiple locations within each of these creek stretches indicated that Laguna 3 (yellow) had a significantly lower amount of phosphorus than the other two locations.
- However, when the exact same locations were retested four months later (February 2026), no significant differences were found.

Comparison to Previous Studies

- The graph to the left shows data that Sonoma State students had collected in previous years from sites in Roseland Creek (green), Colgan Creek (purple), the Laguna de Santa Rosa (orange/blue/yellow), and Copeland Creek (red/gray/pink).
- The Laguna 1 region (orange) is where the first sediment removal project had taken place to generate Water Quality Trading Credits in 2019. It had been studied the most and had the most variability in phosphorus results.
- The Laguna 2 (blue), Laguna 3 (yellow), and Copeland 1 (red) data collected this year are consistent with the adjacent Laguna 1 region (orange) results from previous years.
- A previous study (2021 - 2022) examined Roseland Creek (green), Colgan Creek (purple), and Copeland 2 (gray) as possible sites for sediment removal.
- In that study, the Copeland 2 region (gray) consistently had the highest phosphorus levels.



Conclusion

- The goal of this study was to determine if one of these areas contained higher sediment phosphorus levels: Laguna 2 (blue), Laguna 3 (yellow) and Copeland 1 (red).
- Sampling multiple locations within these areas at different times showed that all three areas had similar phosphorus levels.
- We compared our recent results with phosphorus data collected by previous students (2018 - 2022).
- We found that the Copeland 2 region (gray) consistently had the highest phosphorus levels and recommend this area for sediment removal to generate of Water Quality Trading Credits.
- This was an unexpected outcome, as the Copeland 2 area was expected to be upstream of the urban impacts of Rohnert Park.
- Further testing is needed to determine if phosphorus loading could be occurring from point sources on the east side of Rohnert Park.

Acknowledgements

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Citations

- Water Quality Trading Framework for the Laguna de Santa Rosa Watershed. North Coast Regional Water Quality Control Board Resolution No. R1-2018-0025 Attachment 1. 7/11/2018.
- Water Quality Trading Framework for the Laguna de Santa Rosa Watershed, California. Kieser & Associates, LLC. September 2015.

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