TEAM Muddy Waters: A Tale of Two Sloughs

2022 ORSEA Capstone Presentation

OREGON MARINE SCIENTIST
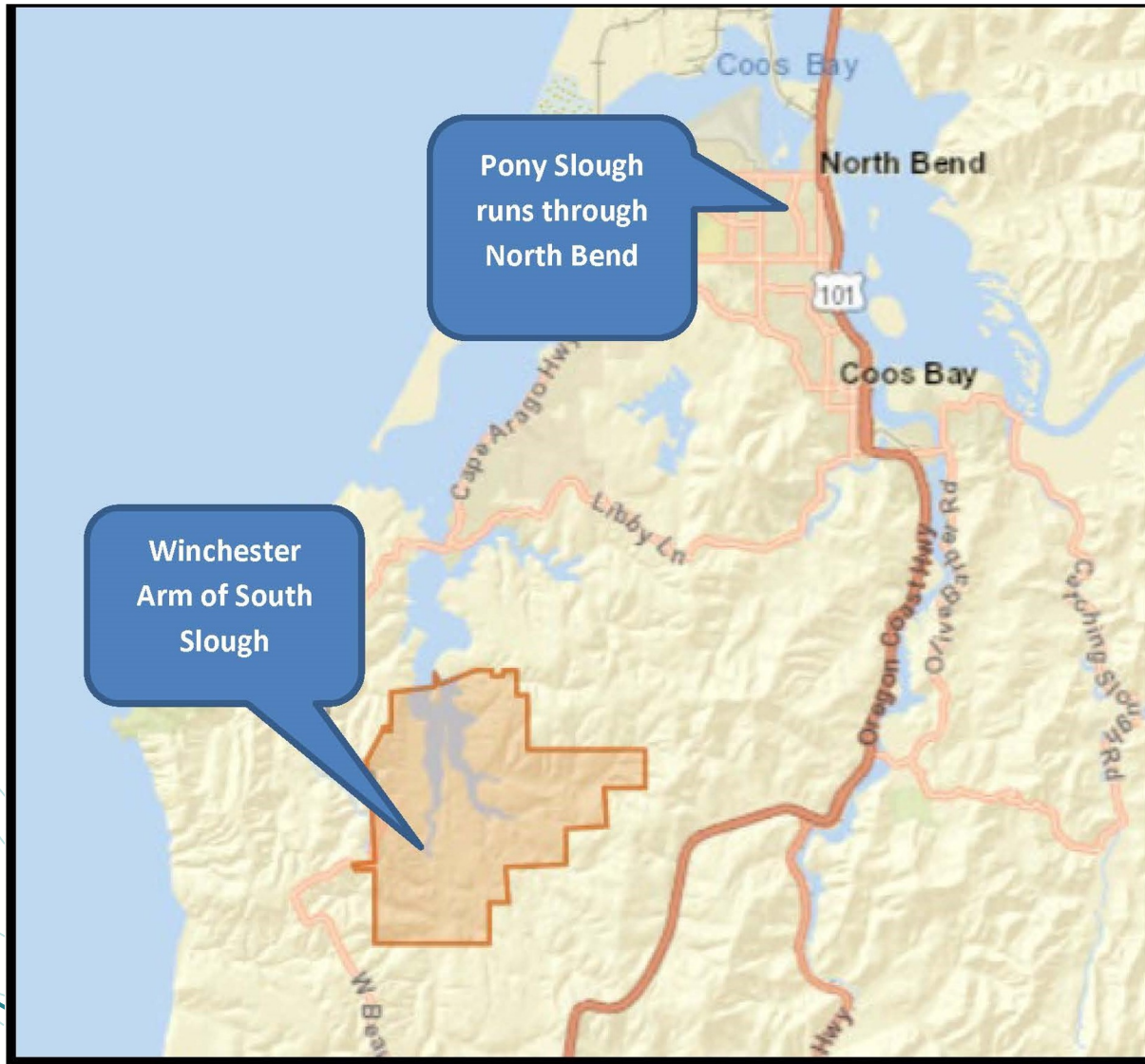AND EDUCATOR ALLIANCE

OUR TEAM

Molly Keogh

Wetland Geologist,
Department of Earth Sciences
University of Oregon

Jackie Gooch

Science Teacher, North Bend Middle School

Our Data Collection Sites

What factors influence an urban estuary to make it different from protected South Slough?

EDUCATION GOALS, STANDARDS, and OBJECTIVES

Learning Goals

1. Water quality is an indicator of estuary health.
2. Water quality parameters (including temperature, pH, turbidity, and dissolved oxygen) can be measured using straightforward tools.
3. Water quality is affected by both human land use in the watershed and by natural processes (tides, seasons).
4. Water quality affects what species live in the estuary.

Science Standards

MS-LS2-2 Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations.

Science & Engineering Practices:
Engaging in argument from evidence in 6–8 builds on K–5 experiences and progresses to constructing a convincing argument that supports or refutes claims for either explanations or solutions about the natural and designed world(s).

Disciplinary Core Ideas:
LS2.C: Ecosystem Dynamics, Functioning, and Resilience
Crosscutting Concepts: Stability and Change Small changes in one part of a system might cause large changes in another part

Math Standard

MATH.CONTENT.8.F.B.4   Construct a function to model a linear relationship between two quantities. Determine the rate of change and initial value of the function from a description of a relationship or from two (x, y) values, including reading these from a table or from a graph. Interpret the rate of change and initial value of a linear function in terms of the situation it models, and in terms of its graph or a table of values. (Possible linear function to explore: water temperature vs. depth)

Learning Objectives

Students will be able to:

1. Collect water samples and analyze them for a variety of water quality parameters.
2. Use a spreadsheet program to develop data tables, input data for comparison, and create charts.
3. Compare water quality data from a local estuary with data collected in South Slough, observe similarities and differences, and formulate hypotheses about what makes them the same or different.
4. Discuss how people affect the water quality in an estuary, and propose ways to improve the water quality.

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5-E LESSON MODEL AND ASSOCIATED ACTIVITIES

Engage

Think about the differences between Pony Creek and South Slough. What do you notice?
Kickoff the unit with a field trip to South Slough to learn about the flow of water from the mountains down to the bay and the natural water filtration processes. If an in-person field trip is not possible, consider obtaining water samples from the area and viewing the overview video of South Slough. Compare water samples from South Slough to your local urban watershed for sediment and water quality.

Explore

Students are scientists: collect data and compare/contrast results
To begin, students will complete a visual assessment of the urban estuary, noting what they can see (in person or through photos, Google Earth, etc.) before water quality tests begin. If students have previously visited the estuary, they may want to share stories.

Next, student scientists will begin collecting water quality data from the urban estuary and compare their findings to data from the Winchester Arm of South Slough (monitoring station SOSWIWQ). (We chose the Winchester Arm because data are available in real time and Winchester's salinity is close to that of our local estuary.)

Explain

Students meet a coastal scientist to learn what data they use and how they apply the data
As students begin collecting data locally and comparing them to South Slough data, it's a good time to revisit the water quality parameters and how they affect the ecosystem. This is where we introduced how sediment affects the aquatic ecosystem.

Note that Explore and Explain are not linear. You'll do a bit of looping.

Evaluate

Student scientists share their interpretations of the data and propose improvements for the urban estuary
Opportunities for formative assessment are built-in throughout the project. There are several options for a summative assessment as well. For the final assessment, each student chooses two charts that they have created, interprets the data, and provides an explanation for the phenomena. The students compile formal reports that include a presentation with suggestions to amend the damage to the urban estuary. If time is limited, students can simply type their explanations and restoration ideas into the spreadsheet.

Elaborate

Students will hypothesize why they got the results they did when comparing an urban estuary to South Slough
Students interact with and interpret the data: They learn how to develop a spreadsheet and create charts from their data. At this point, they can begin to establish relationships between parameters and hypothesize influences on the ecosystem. For instance, pH decreases when temperature increases, leaving our urban slough warmer and more acidic.

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