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Community members of all ages work together to reveal the dynamic nature of Liberty Bay

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Lauren Kemper, Markie Rodgers, Melissa O'Brien, Catherine Somerville, Charles Kleinwort, Nicole Robbers, Sylvia Yang

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COMMUNITY

Making connections with each other and Liberty Bay

PURPOSE:

- Community members ("Community Scientists") work together in complementary roles to monitor Liberty Bay.
- Furthermore, everyone's perspectives inform the investigative process, which improves the project and provides a unique, collaborative experience.

ENGAGEMENT METHODS:

To involve the community and assess the effectiveness of the project, we:

- Created an internship program for college students to create and lead the monitoring program
- Incorporated the research project into our 3rd-5th grade school field trip program
- Scheduled volunteers to assist in data collection and share the experience with our aquarium visitors
- Interviewed the participants about what the experience has meant to them

Community Scientists find meaning through various roles.

Community Scientists have the opportunity to:

Grades 3-5

- Collect temperature, dissolved oxygen, salinity data in the Floating Lab

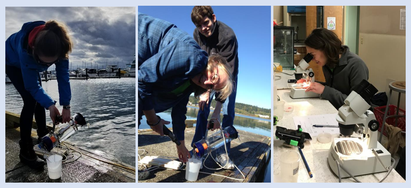
- Use authentic scientific equipment

"[The students] enjoy being a part of something, rather than just being told about it. They enjoy taking the measurements, and the fun of using real scientific instruments. They enjoy the discovery."
– Bruce C. Education Director

High School & Adult Volunteers

- Collect temperature, dissolved oxygen, salinity, chlorophyll data at the Poulsbo Marina
- Count and identify plankton
- Share the experience with the community

- Interact with the scientific community
- Share their findings with other people



"I really enjoy being able to participate in actual scientific research and interact with a scientific community during high school. I get to work with people with advanced education in scientific fields, and they all teach me so much. I feel like the data I collect will actually help people realize important things about Liberty Bay." *– Audrey C.*

"My most important contribution is, I think, teaching volunteers and members of the community what we're doing and how to do it. I directly help collect data most weeks, but I think teaching others what we do is my most vital role." *– Sam L.*

College Interns

- Lead the volunteers
- Collect, analyze, interpret data from 4 sites
- Communicate findings via public lecture

- Conduct the process of scientific investigation

"I've had the amazing opportunity to learn what it is like to work on a long-term research project which was something I haven't gotten the opportunity for in my classes. I've learned valuable skills that will really help prepare me for a career in the real world of science and that's an experience I'll always be grateful for."*– Niki R. Intern*

DISCUSSION:

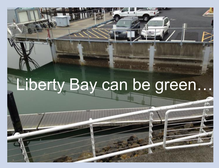
- Engaging the community provided them an enriching experience and allowed for more data to be collected.
- As the project continues, we could teach 3-5th grade students to analyze and interpret the data afterward.
- We are creating a Community Science and Art Room with a project work area to include our visitors in the monitoring project and display current project information.
- We may use the data to schedule the timing of an annual 'Return of the Plankton' spring celebration for community education.

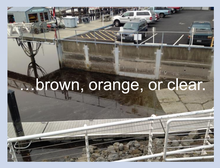
SCIENCE

How and why does the Liberty Bay estuary change?

PURPOSE:

- Community members observed that the color of the water in Liberty Bay can change from one day to the next.
- We sought to understand interrelationships and variation in the abiotic characteristics and planktonic community of Liberty Bay by establishing a long-term monitoring program.

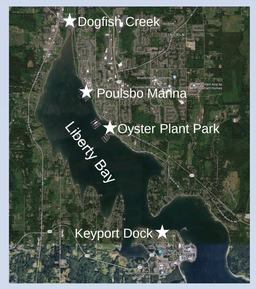




SAMPLING METHODS:

At 1-4 sampling sites from head to mouth of Liberty Bay (see map), every 3-4 days, we:

- Measured depth profiles of salinity, dissolved oxygen, temperature, chlorophyll
- Collected 2 quantitative plankton samples, using 100 & 300 micron plankton nets for abundance and taxon richness of phytoplankton and zooplankton



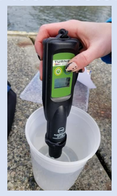
Community Scientists collect valuable data about Liberty Bay.

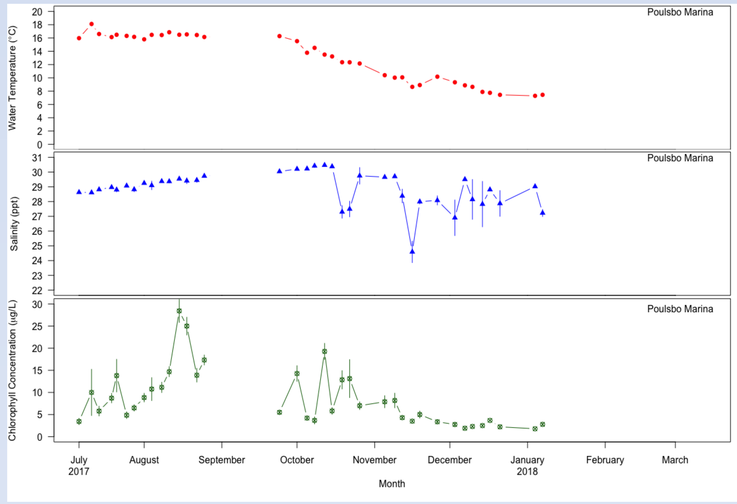
Liberty Bay is a dynamic estuary.

Liberty Bay's water properties and plankton abundance varied within and amongst seasons.

YSI meter

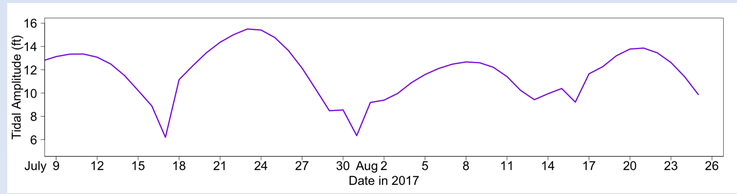
Fluorometer





- Mean water temperature in Poulsbo Marina decreased steadily in winter compared to summer.
- Mean salinity gradually increased throughout summer & fluctuated in winter due to episodic freshwater input (rain).
- Mean chlorophyll concentration decreased in winter, demonstrating lower phytoplankton abundance.

Tidal amplitude = MHHW – MLLW
From WWW Tide and Current Predictor



- In the summer (July-Aug), tidal flushing may be related to cycles of phytoplankton bloom and bust.

DISCUSSION:

- We observed that plankton blooms and species composition in Liberty Bay are episodic (possibly tidally driven) and seasonal (possibly day length, temperature, and/or salinity driven).
- Depth profiles of salinity and temperature along the estuarine gradient provide evidence for periodic cycles of temperature stratification, deepening of stratification, and tidal mixing during summer, and then salinity stratification due to freshwater-input and wind-driven mixing during winter (data not shown)
- However, further data analysis and continued data collection is necessary to observe if this pattern happens every year.
- Data analysis of zooplankton community composition and abundance may elucidate whether phytoplankton blooms could be bottom-up versus top-down control. In the future, we would like to quantify occurrence of jellyfish blooms as another trophic level in the food web.